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The Birds of
Southeastern
Victoria Island
and Adjacent
Small Islands

By David F. Parmelee
H. A. Stephens
Richard H. Schmidt

Canada 1967

Department of the
Secretary of State

THE BIRDS OF SOUTHEASTERN VICTORIA ISLAND
AND ADJACENT SMALL ISLANDS



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ADJACENT SMALL ISLANDS

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Contents

RÉSUMÉ, viii

INTRODUCTION, 1

ACKNOWLEDGMENTS, 4

HISTORICAL NOTE, 6

NARRATIVE, 9

CLIMATE, 13

PRINCIPAL NESTING HABITATS, 15

TAXONOMIC CONSIDERATIONS, 19

METHODS, 21

SPECIMENS, 23

SYSTEMATIC LIST OF BIRDS, 24

Yellow-billed Loon, 24, 216

Arctic Loon, 29, 216

Red-throated Loon, 32, 216

Whistling Swan, 34, 217

Canada Goose, 36, 217

Brant, 40, 217

White-fronted Goose, 44, 218

Snow Goose, 46, 218

Mallard, 49

Pintail, 49, 218

Green-winged Teal, 49, 218

Scaup, 50

Oldsquaw, 50, 218

Common Eider, 52, 219

King Eider, 56, 219

Red-breasted Merganser, 62

Rough-legged Hawk, 62, 219

Golden Eagle, 68

Gyr Falcon, 68

Peregrine Falcon, 68, 219

Sparrow Hawk, 70

Willow Ptarmigan, 71, 219

Rock Ptarmigan, 75, 220

Sandhill Crane, 79, 220

Semipalmated Plover, 80, 220
 American Golden Plover, 83, 220
 Black-bellied Plover, 88, 220
 Ruddy Turnstone, 93, 221
 Whimbrel, 99
 Knot, 99, 221
 Baird's Sandpiper, 101, 222
 Dunlin, 109
 White-rumped Sandpiper, 110, 222
 Pectoral Sandpiper, 113, 222
 Semipalmated Sandpiper, 120, 223
 Stilt Sandpiper, 123, 223
 Buff-breasted Sandpiper, 130, 224
 Sanderling, 135, 224
 Red Phalarope, 136, 225
 Northern Phalarope, 141, 225
 Pomarine Jaeger, 142, 226
 Parasitic Jaeger, 146, 226
 Long-tailed Jaeger, 149, 226
 Glaucous Gull, 152, 226
 Herring Gull, 156
 Thayer's Gull, 156, 227
 Sabine's Gull, 162, 227
 Arctic Tern, 168, 227
 Thick-billed Murre, 171
 Black Guillemot, 172
 Snowy Owl, 172, 227
 Short-eared Owl, 182
 Horned Lark, 183, 228
 Tree Swallow, 186
 Bank Swallow, 186
 Barn Swallow, 187
 Common Raven, 187, 228
 Water Pipit, 188, 228
 Red-winged Blackbird, 190
 Hoary Redpoll and Common Redpoll, 190
 Savannah Sparrow, 194
 Slate-colored Junco, 194
 Tree Sparrow, 195
 Harris's Sparrow, 195
 White-crowned Sparrow, 195
 Lapland Longspur, 195, 228
 Snow Bunting, 202, 228

HYPOTHETICAL LIST, 207

MAMMALS, 208

BIBLIOGRAPHY, 211

SUPPLEMENT, 215

List of Plates

- I Flying Brant near Mount Pelly, *Frontispiece*
- II Pair of Yellow-billed Loons near Mount Pelly, 25
- III Baird's Sandpiper incubating near Cambridge Bay, 102
- IV Pectoral Sandpiper incubating near Cambridge Bay, 115
- V Stilt Sandpiper incubating near Cambridge Bay, 125
- VI Buff-breasted Sandpiper incubating on Jenny Lind Island, 131
- VII Finlayson Islands Gullery, 157
- VIII Thayer's Gull near its nest at Finlayson Islands gullery, 158
- IX Sabine's Gull incubating on Jenny Lind Island, 163
- X Snowy Owl with young near Cambridge Bay, 173

List of Figures

- 1 Map of south coast of Victoria Island from Anderson Bay
west to Wellington Bay, 20
- 2 Map of southeast coast of Victoria Island and
Jenny Lind Island, 22
- 3 Ground display of Buff-breasted Sandpiper, 133
- 4 Growth curve of Snowy Owls, 178

Résumé

Des recherches ornithologiques ont été entreprises sur l'île Victoria, ou à proximité, dans l'archipel canadien de l'Arctique, au cours des étés 1960 et 1962. Le *National Science Foundation* et *Arctic Institute of North America* participaient, dans une large mesure, au financement de l'expédition. Les recherches ont eu lieu principalement dans régions de Cambridge Bay – Mount Pelly (côte sud). De là, utilisant l'avion, le bateau ou le traîneau, des équipes ont rayonné vers les régions périphériques: Îles Finlayson, dans le détroit de Dease; baie Glenelg, sur la côte septentrionale de l'île Victoria, et île Jenny Lind, dans le golfe Reine-Maud, au sud du détroit de Victoria. M. George Miksch Sutton, professeur de zoologie chargé de recherche à l'université d'Oklahoma, s'est joint à l'expédition en 1962, à titre personnel.

Au cours de cette étude, les membres de l'expédition ont rassemblé sept cent quatre-vingt-seize spécimens d'oiseaux représentant 51 espèces, 22 petits mammifères représentant trois espèces et environ 967 plantes représentant plus de 168 espèces. La plupart de ces spécimens se trouvent au Musée national du Canada, à l'université d'Oklahoma (collection Sutton) et au *Kansas State Teachers College* d'Emporia.

Sur les 60 espèces d'oiseaux énumérées par les auteurs, au moins 45, et peut-être jusqu'à 49, se sont multipliées dans le sud-est de l'île Victoria et dans les petites îles voisines, ce qui dénote la présence d'une faune avienne particulièrement riche dans ces îles de l'Arctique. Les oiseaux de rivage, labbes, goélands et sternes s'y reproduisent généralement. Les oiseaux marins ou les alcidés y sont rares et rien ne semble indiquer qu'ils se reproduisent dans la région. La région de la baie Glenelg, sur la côte septentrionale, s'est révélée particulièrement stérile en ce qui concerne la plupart des types de la faune avienne.

Les spécialistes ont constaté que les oiseaux de la région représentaient des formes propres au nouveau monde. Ils n'ont trouvé aucune race de l'ancien monde, état de choses assez commun dans les parties septentrionales de l'archipel de l'Arctique. Les oiseaux de la région de Cambridge Bay – Mount Pelly semblent subir fortement l'influence des populations du continent plus au sud; la faune avienne de l'île Jenny Lind est semblable à celle de l'île Roi-Guillaume. Plusieurs espèces, présentant les caractéristiques de la zone du Pacifique, se reproduisent dans la région.

Au cours des deux années, les chercheurs ont étudié, à Cambridge Bay – Mount Pelly, le calendrier de l'arrivée, de l'accouplement et du

départ des oiseaux. Les changements constatés sont minimes, si ce n'est à propos des espèces qui subissent directement l'influence du cycle des lemmings, lequel atteignit des niveaux respectivement élevés et assez bas en 1960 et 1962. Les auteurs ont plus ou moins étudié toutes les espèces qu'ils ont pu observer, mais, en 1962, leurs travaux portaient principalement sur le comportement des oiseaux de rivage au cours de la reproduction et sur la préférence qu'ils manifestaient à propos de l'habitat. Plusieurs oiseaux, des adultes et des jeunes, ont été bagués. Selon les retours notés jusqu'à ce jour, la migration des oiseaux de l'île Victoria semble toucher bien des lieux, notamment l'Est et l'Ouest du Canada, le Centre et l'Ouest des Etats-Unis et la Sibérie orientale.

La faune avienne de l'île Jenny Lind a tellement impressionné l'aîné des auteurs qu'il s'est promis d'y retourner. Cependant, l'occasion de poursuivre les études entreprises ne s'est représentée que quatre ans plus tard et, à cette époque, les épreuves du manuscrit des deux expéditions précédentes étaient prêtes. Néanmoins, on s'est efforcé d'inclure dans ce rapport les observations d'ordre général de quelque importance qui se rapportaient à la saison de 1966 (*voir* Supplément page 215). Les études détaillées sur certains oiseaux de rivage seront publiées à part.

M. Dale W. Greiner, Instructeur, et M. Walter D. Gaul étudiant diplômé du Kansas State Teachers College ont collaboré avec l'aîné des auteurs lors de l'expédition de 1966 à l'île Jenny Lind. M. George M. Sutton s'est joint à l'expédition en qualité d'enquêteur autonome et a consacré une grande partie de son temps à peindre les oiseaux de l'Arctique.

En 1966, la période de reproduction des aviens a commencé relativement tôt, l'état du temps et de la neige les favorisant. Les lemmings étaient en nombre modéré et ont permis d'étudier divers aspects de la vie des oiseaux dans des conditions différentes de celles qui existaient en 1960 et en 1962.

PLATE I



Flying Brant near Mount Pelly.

Introduction

The original objective in 1960 was to study the birds of Shepherd Bay, Boothia Peninsula. Satisfactory flight arrangements failed to materialize, and the plan finally had to be abandoned. Comparatively little-known southeastern Victoria Island held greater promise. Early exploration dating back to 1839 alluded to interesting bird life there. Collectors and scientists of various disciplines later reported a fairly rich and varied avifauna. In the region as a whole we counted on finding 30 species of birds, at least 23 of them breeding. The National Museum of Canada took an active interest in the project, since not many records were available from Victoria Island. The few existing bird specimens from there were old and, for the most part, lacked complete data.

We chose Cambridge Bay as a base of operation for several reasons. The settlement and DEW-Line Station nearby were serviced regularly by aircraft. Supplies could be obtained readily from the Hudson's Bay Company Post. Guides, dog teams, and boats could be obtained from the large Eskimo population that resided there. Mount Pelly, the highest land in southeastern Victoria Island, gave promise of a distinct type of habitat. Moreover, the Finlayson Islands, the cliffs of Anderson Bay, and immense inland lakes were within reach.

These outlying areas and others were visited, but much of the 1960 season was spent on the tundra from the upper end of Cambridge Bay to Mount Pelly. The senior author spent most of his time afield collecting specimens and gathering nest data. Schmidt remained mostly at Cambridge Bay, collecting and preparing specimens. Raymond Waters, a Britisher formerly from Rhodesia, worked independently in the area from mid-June to mid-July. His ideas on the bird life there were of particular value, since he was well informed on old-world tundras. According to Waters (1961), the bird life at Cambridge Bay was richer than at any other arctic area visited by him, and by European standards was a 'Bird Paradise.' Weather conditions at Cambridge Bay in 1960 were ideal, and lemmings were abundant.

The plan for 1962 was to return to Cambridge Bay and from there fly by charter aircraft to the north coast of Victoria Island, an area whose wildlife was heretofore little known. We also wished to check the arrival, breeding, and departure schedules of birds at Cambridge Bay against the 1960 season. In this we found little variation except in those species directly influenced by the lemming cycle, which was at a low point that year. Arriving early at Cambridge Bay, we had an especially good opportunity to observe the arrival period of most species. Weather conditions were ideal from June 1, and we had made our data on schedules representative of conditions for average or above average seasons. Research emphasis in 1962 was on shore-bird behaviour and habitat preference. Stephens, though an ornithologist and

collector in his own right, joined the expedition as official botanist. Dr. George Miksch Sutton, Research Professor of Zoology, University of Oklahoma, joined as an independent investigator and contributed immensely to the success of the expedition. Stephens and Sutton remained at Cambridge Bay after the senior author and Schmidt left the region in mid-July. Their September observations were of special value.

Our trip to the north coast of Victoria Island on June 8 was disappointing. The mountainous area of Glenelg Bay was a spectacular desert but nearly sterile with respect to birds—much more so than the great desert tundras of Ellesmere and Axel Heiberg islands. Had we seen but a few birds flying across the sky that day we likely would have stayed there for five weeks as planned. The decision to leave that area the same day was probably a good one.

Inasmuch as the Cambridge Bay area with its high July temperatures (Mean Daily is 46°F.) lies within the Low Arctic (*see* Johansen, 1956), we wanted very much to visit the cooler east coast of Victoria Island but chose Jenny Lind Island southeast of there instead. Although previous reports of its wildlife were not very enlightening or encouraging, its location in Queen Maud Gulf at the southern edge of Victoria Strait was the more promising. The island was also attractive because of its small size. The DEW-Line Station airstrip allowed for landings in mid-June when waters were neither open nor closed.

Bird life on Jenny Lind Island was not so varied as at Cambridge Bay, there being fewer types of habitat. Those birds that were concentrated there presented ideal conditions for study. The more polar climate of Jenny Lind Island attracted a somewhat richer high-arctic avifauna. However, the southern bird element was there, as were eastern and western elements. We failed to find a common nesting ground of the Pacific and Atlantic brants; nor did we find Ross's Goose (*Chen rossii*) among the Snow Geese that bred there. We did find an interesting assemblage of breeding shorebirds. Many shorebird species that pass as transients (*see* Hansen, *et al.*, 1956; Aleksuk, 1964) through Perry River breed only a few miles to the north on Jenny Lind Island, and elsewhere to the north. The avifauna of Jenny Lind Island appears to be like that of King William Island to the east. It is also similar to southeastern Victoria Island, but it is influenced less by the mainland, judging from birds breeding in the Cambridge Bay area.

The senior author was so impressed with the avifauna of Jenny Lind Island that he vowed to return. However, opportunity for further study did not present itself until four years later, by which time galley proof was available for the manuscript covering the first two expeditions. Nevertheless, an attempt was made to include in this report general observations of significance for the 1966 season (*see* Supplement, p. 215). Detailed studies of certain shorebirds will be published separately.

Mr. Dale W. Greiner, Instructor, and Mr. Walter D. Gaul, Graduate Student, both of Kansas State Teachers College, assisted the senior author on Jenny Lind Island in 1966. George Miksch Sutton joined the expedition as an independent investigator and spent much of his time painting arctic birds.

The avian breeding season in 1966 was comparatively early, for weather

and snow conditions were favorable to many birds. Lemmings were moderately abundant and afforded an opportunity to study aspects of bird life under conditions not experienced in 1960 and 1962.

We list 68 species of birds for southeastern Victoria Island and adjacent small islands. Three of the 68 were not seen by us. We collected 58 species and identified seven species by sight. Listed below are 57 species for the Cambridge Bay – Mount Pelly area and 55 species for Jenny Lind Island.

It is highly probable that 48 species, and perhaps as many as 50 species, breed in southeastern Victoria Island and adjacent small islands. Of 44 species listed below as positively breeding, the nests of 40 were seen by us. Thirty-five species positively, and seven additional species probably, breed in the Cambridge Bay – Mount Pelly area. Thirty-six species positively, and three additional species almost certainly, breed on Jenny Lind Island. The nests of two species not found breeding in either of these areas were found on the Finlayson Islands.

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The expedition to Victoria Island in 1960 was financed largely through research grants-in-aid awarded by the Arctic Institute of North America (AINA-62) and the National Science Foundation (NSF-12856). The expedition to Victoria Island in 1962 was financed largely through a research grant-in-aid awarded by the National Science Foundation (NSF-19597).

The expedition to Jenny Lind Island in 1966 was financed through research grants-in-aid awarded by the National Science Foundation (NSF-GB 4904) and Kansas State Teachers College.

The National Museum of Canada provided the 1960 and 1962 expeditions with arctic field equipment. The Danforth Foundation, The Society of Sigma Xi, and Kansas State Teachers College provided travel funds which enabled us to examine several times the extensive collection of arctic birds in the National Museum of Canada. Professor George Miksch Sutton, who accompanied us in 1962 and 1966, not only contributed financial support to the expeditions but also turned over his copious field notes for inclusion in this report.

The Canadian Wildlife Service cooperated with us in a friendly and efficient manner. We thank Messrs. W. Winston Mair, F. H. Schultz, W. E. Stevens, and R. H. Mackay for permits to collect and band birds in the Canadian Arctic. We especially thank Mr. Thomas W. Barry for including us on waterfowl survey flights over southern Victoria Island.

Federal Electric Corporation, which serviced the DEW-Line Stations in Canada, kindly consented to provide us with air transportation between Edmonton, Alberta, and Cambridge Bay in 1960 following a sudden change in flight schedule by commercial airlines. Pacific Western Airlines provided all our air transportation in 1962. We are especially grateful to their pilot, Mr. Paul Hagedorn, who flew us to remote areas on Victoria Island and to Jenny Lind Island in Queen Maud Gulf.

Mr. G. W. Rowley, Department of Northern Affairs and National Resources, aided us in obtaining transportation to Jenny Lind Island in 1966. Pacific Western Airlines and Federal Electric Corporation provided the transportation. Mr. W. Laserck of Northward Aviation flew us to remote areas on the mainland south of Jenny Lind Island.

Mr. Gaëtan Chaput, former station chief at the DEW-Line Station on Jenny Lind Island, did everything possible to make our operation there a success. Many individuals helped us while we were at Cambridge Bay. Mr. William Heslop, store manager for Hudson's Bay Company, provided us with quarters in which we based our operations in 1960. Mr. Fred Ross, manager of Arctic Lodges, provided quarters in 1962. Area administrator Mr. Jameson Bond, welfare officer Mr. Paul Gorlick, and Mr. George Porter,

of the Department of Northern Affairs and National Resources, and Corporal R. I. Fendrick of the Royal Canadian Mounted Police aided us with local transportation by providing sledges and boats. Mr. C. H. Robinson, former technical officer for the Department of Northern Affairs, helped us in ways too numerous to mention.

Mr. Walter Little, Station Chief at the DEW-Line Station on Jenny Lind Island in 1966, rendered invaluable assistance to our expedition. Many station personnel, especially Messrs. Aime Ahegona, John Bosse, Gary Gagan, Harold Green, Walter Hanchar, Jimmy Komeak, Rod MacDonald, Charles MacKinnon, Lorne A. Martin, Rus Parks, and Armin F. Seethaler, helped in various ways. Special thanks go to Mr. John P. Ryder, who kindly showed us his study area on the mainland where Ross's Goose bred.

Many persons turned over to us their notes on birds observed by them, chiefly in the Cambridge Bay area. Helping us in this respect were Mr. Raymond Waters, attorney, formerly from Rhodesia; Messrs. David McCall and John MacDonald of the Hudson's Bay Company; Mr. William Bock, former school principal at Cambridge Bay; Miss Jeanie MacKerrell, former nurse at Cambridge Bay; Mr. Les Clark, engineer for the Department of Transport; Reverend William Evans, Anglican minister; Father Louis Lemer, Catholic priest; personnel of the Fisheries Research Board of Canada under supervision of Messrs. J. G. Hunter and Brian Beck. With a superb knowledge of the birds of the region, Eskimo David Koomyuk guided us to many excellent areas. Mr. R. F. Oldaker of Vancouver, British Columbia, kindly sent us his notes on the wintering of Thayer's Gulls, one of which migrated from Cambridge Bay.

We wish to express our gratitude to President John E. King, Dr. Ted F. Andrews, Dr. Howard Bellows, Dr. Laurence C. Boylan, Dr. John Breukelman, Mr. Keith Bumstead, Dr. Jack L. Carter, Dr. Ralph P. Frazier, and Dr. J. T. Sandefur, all of, or formerly of, Kansas State Teachers College, for many assistances rendered; to Messrs. Walter D. Graul and Dale W. Greiner for assistance afield on Jenny Lind Island in 1966; to Mrs. David F. Parmelee, who typed early and final drafts of the manuscript and helped in numerous other ways.

Dr. Philip S. Humphrey of the Smithsonian Institution loaned us museum specimens, as did Dr. Richard F. Johnston of the Museum of Natural History, University of Kansas, Lawrence. Many persons of the National Museum of Canada gave invaluable assistance: Dr. A. E. Porsild, Chief Botanist, identified certain plants and verified identification of others; Mr. John A. Crosby, Staff Artist, provided the maps; Mr. S. D. MacDonald, Assistant Curator of Ornithology, loaned arctic equipment and made museum facilities and specimens available to us. We are most grateful to Mr. W. Earl Godfrey, the National Museum of Canada's Curator of Ornithology, for suggestions on bird taxonomy and for his generous help in reviewing the manuscript, though he is in no way responsible for errors.

Historical Note

A brief résumé of the history of southern and eastern Victoria Island and adjacent small islands is presented below with reference to birds. Names of contributors not listed here appear further on in the main body of the report.

1839. From a promontory on Cape Alexander, Thomas Simpson (1843) of Hudson's Bay Company looked across Dease Strait on August 23, 1838, and bestowed the name 'Victoria' on the extensive land northward. He also named what then appeared to be a point of land 'Cape Pelly'—the easternmost known extremity of 'Victoria Land' of the day. Simpson corrected his error the following year by changing Cape Pelly to Mount Pelly when he and P. W. Dease boated along the Victoria Island coast from near Cape Colborne, past the Finlayson Islands, to Byron Bay, and beyond, during September 6–10. Cambridge Bay, Wellington Bay, Sussex Hills, and Cape Peel were among the places named. Noted were geese, ducks, and owls.

1851. That part of Victoria Island formerly called Wollaston Land was explored by John Rae (1852), who sledged along the coast between $110^{\circ}2' W$ and $117^{\circ}17' W$ during May 5–30 naming Wilbank Bay and the Richardson Islands and places in western Victoria Island. Ptarmigan were the only birds mentioned in his narrative. The same year Rae left Cape Alexander on July 27 and boated to the Finlayson Islands and Cambridge Bay where, on July 29, he explored the upper end of the bay, noting Greiner Lake and the stream that flows south from there. The first to travel Victoria Island east of Cape Colborne, he surveyed the coast all the way to Collinson Peninsula and obtained $70^{\circ}2' 36'' N$ on August 13. During this time he relocated Back Point and named Anderson Bay, Sturt Point, Parker Bay, Stromness Bay, [Jenny] Lind Island, Taylor Island, [John] Halkett Island, and Pelly Point. He noted geese, plovers, and owls. Returning to Cambridge Bay on August 13, Rae proceeded west and finally reached the Richardson Islands on August 26 and Ross Point on August 28.

1852–1853. H.M.S. *Enterprise* commanded by Captain Richard Collinson (1889) left the winter quarters of Walker Bay in far western Victoria Island on September 1, 1852. Following a brief exploration of Prince Albert Sound, Collinson arrived at the winter quarters of Cambridge Bay on September 26. The next spring a party was sent east along the south shore of Victoria Island in search of the lost Franklin Expedition. The party touched upon Jenny Lind Island and also explored the east coast of Victoria Island beyond the point obtained by Rae in 1851. Gateshead Island, the farthest north, was reached May 10. Returning by much the same route, the search party made Cambridge Bay on May 31, first having travelled inland a short distance to Long Lake.

The Finlayson Islands and adjacent waters, seen earlier by Simpson and Dease, were examined. Collinson recorded several species of birds for southeastern Victoria Island, and an uncertain number of specimens from there were prepared by the ship's surgeon. Presumably they are still preserved in the British Museum.

1905. Although the Gjøa Expedition centred its activities for nearly two years on King William Island, where a significant summer collection of birds was made and later reported on by Schaanning (1933), a few notes on Victoria Island birds appear in Roald Amundsen's report. A member of the Expedition, Lieutenant G. Hansen, pushed man's knowledge of the east coast of Victoria Island to 72° N (Amundsen, 1908).

1908–1918. Vilhjalmur Stefansson's expeditions to the Western Arctic encompassed a large area of Victoria Island, including S. Storkerson's exploration of the north coast in 1917, but most of the biological investigations were conducted on the mainland coast to Coronation Gulf. Although the exhaustive ornithological studies carried on by Rudolph Martin Anderson (1913, 1915, 1917, 1937) were west of our study area, they were important enough to warrant mention here.

1911–1919. A number of boat trips along the Alaskan and Canadian coasts to western and eastern parts of Victoria Island were made by Captain Joseph F. Bernard, who collected a fairly extensive series of birds, nests, and eggs. Some of these specimens are widely scattered in various collections. Others are preserved in the National Museum of Canada and have been reported on in part by Taverner (1916, 1927). Unfortunately, the collection site and date for many of these specimens are vague or lacking. Bernard (1925) was caught in the ice between De Haven Point (east coast) and Taylor Island in late August of 1917 and forced to remain two years, during which time he experienced a backward climatic season in the summer of 1918 and a warm summer in 1919.

1925–1929. A few notes on birds of southeastern Victoria Island appear in the writings of Lachlan Taylor Burwash (1929, 1931), who collected economic, historical, geological, botanical, anthropological, and other materials for the Canadian Government. Of particular interest are his September observations of waterfowl. On August 31, 1925, Major Burwash anchored off Jenny Lind Island, noting neither wildlife nor signs of native occupation.

1949. A. E. Porsild (1951: 40–2; 133–8) studied the plants of Banks Island and Victoria Island, chiefly the western part, during the summer of 1949 and reported on the 24 species of birds recorded by the expedition. Only seven species were noted during Porsild's brief visits to more eastern parts of Victoria Island, but he did record two important nestings for the little known Washburn Lake area on August 4. Porsild also visited Lake Tahoe, lakes north of Cambridge Bay, and those near the Richardson Islands, during August 2–7. There can be no doubt that a climatically backward season as witnessed by Porsild that year can be deleterious to the nesting success of arctic birds.

1953. Robert H. Smith and Everett L. Sutton (1954) made a waterfowl survey flight over south-central Victoria Island between Cambridge Bay and Prince Albert Sound and reported small numbers of three species of geese on all observed rivers draining to the south coast. Additional waterfowl surveys by the Canadian Wildlife Service have been conducted since then over the arctic islands, including Victoria Island (*see* Narrative p. 9).

1954. In studying marine invertebrates in the Canadian Arctic, Derek V. Ellis (1956) noted birds wherever his travels took him. During August 6-18, he compiled a list of 25 different birds for the Finlayson Islands - Cambridge Bay area, not including an additional six species that were tentatively identified. Most significant was his finding evidence of breeding for 19 species.

1955. As an adjunct to studies related to geographical surveys, J. Keith Fraser (1957) noted the birds of southeastern Victoria Island during May 27 to August 28, listing 25 different birds and finding evidence of breeding for several species. His greatest contribution to the ornithology, however, was not in his list of birds but in his broad coverage of the region. Other than Cambridge Bay, Fraser visited Anderson Bay and the remote areas of Padliak Inlet (south arm of Albert Edward Bay) and De Haven Point in far eastern Victoria Island. He also visited Wellington Bay and the western half of Ferguson Lake.

Narrative

1960

May 31 – August 30

May 31. Parmelee and Schmidt left Edmonton, Alberta, and flew directly to Cambridge Bay on a Federal Electric Corporation scheduled flight. Base camp was established at one of Hudson's Bay Company buildings beside the beach near the upper end of Cambridge Bay. From there trips were made by foot to many places within 12 miles of the bay. The area visited most often during summer was a four-square-mile strip of varied tundra immediately north of the upper end of the bay and west of a shallow stream which, following the advent of the thaw, flowed from Greiner Lake to the bay. From 8th June trips were made fairly often to Mount Pelly and vicinity, including the northeastern shore of Greiner Lake. Occasional trips were made to the tundra north of the West Arm of Cambridge Bay, several miles beyond the DEW-Line Station and airstrip.

June 10. A tent and food cache were established north of the West Arm of Cambridge Bay and maintained until July 23.

June 14. Raymond Waters arrived at Cambridge Bay. A serious oölogist, he visited many places by foot but chiefly Mount Pelly and the tundra north of the West Arm. He departed from Cambridge Bay on July 12.

June 16. A tent and food cache were established on a southwest slope of Mount Pelly and maintained until August 16.

June 20. The Finlayson Islands were visited by means of a sledge and dog team under the guidance of Eskimo Luke Kodlak. Well-defined shore leads had formed along Cambridge Bay, but the sea ice had lifted and travel by it was feasible. The 30-mile-trip was accomplished in seven hours, part of the time having been spent skirting a lead that extended for miles across Dease Strait. A temporary camp was set up close to a gullery near the distal end of the Finlayson Island chain. The return trip was made in six hours on June 22.

August 6. Schmidt accompanied David McCall and John MacDonald on a boating excursion along the east shore of Cambridge Bay to a cove near a small island about seven miles north of Cape Colborne, returning the same day. Thomas W. Barry, conducting a waterfowl survey for the Canadian Wildlife Service, arrived at Cambridge Bay and from there made several flights to remote areas on Victoria Island during August 7-9. Barry and his personnel departed from Cambridge Bay August 10.

August 7. Parmelee accompanied Barry on an easterly waterfowl survey over southeastern Victoria Island. Flying at low altitudes in a Beaver aircraft equipped with floats, the flight headed north from Cambridge Bay to Mount Pelly, thence southeast by way of Long Lake to Anderson Bay. From there the flight proceeded east along Queen Maud Gulf to Sturt Point, Parker Bay, Stromness Bay, thence overland north nearly to Cape Adelaide on the east coast. Turning west, the flight followed the east coast of Padliak Inlet, thence north across the upper end of Albert Edward Bay, thence east across southern Collinson Peninsula. Northward again the flight reached $70^{\circ}10'$ N. The return flight was direct to Cambridge Bay.

August 8. Parmelee accompanied Barry on a westerly waterfowl survey flight that took an erratic course across Kitiga Lake, along the east and north shores of Wellington Bay, and over the Sussex Hills to approximately $69^{\circ}43'$ N, $108^{\circ}25'$ W where a brief landing was made on one of many lakes. The flight proceeded southwest to $111^{\circ}24'$ W, thence south to $69^{\circ}18'$ N, $111^{\circ}32'$ W where another lake landing was made. From there the flight went south, at one point west, thence southeast to the Richardson Islands in Coronation Gulf. The return flight took a coastal course east to Wilbank Bay, turned far inland to the north, and eventually followed the Lauchlan River southeast to Byron Bay. Another pass inland was made west of Cape Peel, but the last lap to Cambridge Bay was coastal beyond Wellington Bay.

August 9. Barry conducted a waterfowl survey in eastern Victoria Island between Cambridge Bay and Hadley Bay (north coast).

August 13. A planned boat trip to Anderson Bay with George Porter was attempted, but rough water forced a landing on the east shore of Cambridge Bay north of Cape Colborne in the cove visited by Schmidt on August 6. Return trip was made 10 hours later the same day.

August 20. Anderson Bay was reached after a four-hour trip by boat operated by Eskimo David Koomyuk. A temporary camp was set up on the island in the bay. Sea cliffs and lush meadows near Anderson Bay were explored for birds. Sea cliffs along the south coast between Back Point and Cape Colborne were examined on the return trip to Cambridge Bay on August 21.

August 25. Parmelee left Cambridge Bay with Koomyuk in late evening and, following a nine-hour boat trip, arrived at Wellington Bay the next day. Most of August 26 and 27 was spent afield along the Ferguson River and at bluff areas east of there, and at the Wellington Bay beaches. The return trip to Cambridge Bay included brief stops at Starvation Cove and elsewhere along the south coast on August 28.

August 30. Parmelee and Schmidt left Cambridge Bay and returned to Edmonton via the route taken previously.

1962

May 10 – September 12

May 10. The authors, accompanied by George Miksch Sutton, left Edmonton on a scheduled Pacific Western Airline flight and arrived at Cambridge Bay the same day following brief stops on the mainland at Fort Smith and Yellowknife. Base camp was established this year in a framed tent within the settlement. Much of the same beach and inland tundra and fresh waters visited in the Cambridge Bay area in 1960 was revisited in 1962. Visited more often was the tundra directly north of the settlement.

May 24. A tent and food cache were established near the northeast corner of Greiner Lake within a few miles of Mount Pelly and maintained by Stephens and Sutton until September 1.

May 29. A large party under the supervision of J. G. Hunter of the Arctic Unit of the Fisheries Research Board of Canada arrived at Cambridge Bay. Hunter established a number of outlying stations, principally at Ferguson Lake and Long Lake. Some of the personnel recorded the birds encountered during their travels. The last of the party departed from Cambridge Bay on September 12.

June 2. A trip to the Finlayson Islands was undertaken with two dog teams guided by Eskimos David Koomyuk and Peter Panaktuk. The teams were driven overland to the vicinity of Long Point near the outer coast and then westward into the Augustus Hills where the thaw was much advanced over that of Cambridge Bay. Breaking camp the following day, the teams were headed southward over frozen Dease Strait to the Finlayson Islands gullery. The return trip to Cambridge Bay was accomplished over sea ice during the late evening of June 3 and early morning of June 4.

June 8. The authors and Sutton, guided by Pacific Western Airline pilot Paul Hagedorn, flew by 'Otter' equipped with skis to the little-known north coast of Victoria Island. From Cambridge Bay the flight headed north over the vast desert interior where the thaw was much advanced over that at the south coast. In circling low above the rugged Shaler Mountains of the Glenelg Bay area, only one lake appeared safe enough for a landing, which was accomplished without mishap. So sterile was this land that all plans for bird study there were quickly abandoned. It was decided then that the return flight would take an easterly direction to Hadley Bay in northeastern Victoria Island. No satisfactory place for study was found there, although landings could have been negotiated most anywhere, since lakes in eastern Victoria Island were frozen shut. From Hadley Bay the return flight was direct to Cambridge Bay.

June 19. The authors and Sutton flew with pilot Hagedorn to Jenny Lind Island in Queen Maud Gulf. A tent and food cache were established at a large lake west of the DEW-Line Station near the east coast. The eastern third of the island was covered extensively during days following. The return trip to Cambridge Bay was made on July 5.

July 12. Parmelee and Schmidt departed from Cambridge Bay for Edmonton via the same route taken earlier. Stephens and Sutton remained at Cambridge Bay, visiting most often the tundra between the bay and Mount Pelly.

August 10. Through the courtesy of the Royal Canadian Mounted Police, Stephens and Sutton boated from the upper end of Cambridge Bay to the Finlayson Islands gullery, returning the same day.

August 20. John Weske and Charles MacInnes arrived at Cambridge Bay. They observed birds near the settlement for several days and departed from Cambridge Bay on August 23.

September 12. Stephens and Sutton departed from Cambridge Bay and returned to Edmonton via the route used earlier.

Climate

Air Temperature

Although maximum daily temperatures may rise above freezing at Cambridge Bay in late May, the aspect remains wintry to the end of the month. This was the case in 1962 when inclement weather persisted without letup during May 19–31. There was relatively little thaw and loss of snow cover then, except on the ridges where evaporation was also a factor. The few pools of meltwater formed during the highs quickly froze with the daily minimums.

In 1960 and 1962 the thaw began in earnest by June 1. The high temperatures that followed transformed the snowy tundra within a few days. Water ran freely by the end of the first week when snow covered less than a fifth of the land and the arctic flower Purple Saxifrage first bloomed. Many tundra ponds were open, or nearly so, but the deeper lakes were frozen to the shore. The fresh waters spilled over the frozen sea inundating the ice in many places.

By the end of the second week of June, snow persisted only in deep depressions or as drifts. Shallow lakes were open though icy on the bottom. Wide leads had formed along the edges of the deep lakes, but a continuous offshore ice remained to mid-July, and even longer on the very large lakes. Shore leads had formed along the bays and outer coasts. Ice at the head of Cambridge Bay broke in late June. Firm ice remained for weeks farther out in the bay but was mostly gone by August. It also disappeared for the most part in Dease Strait and the western end of Queen Maud Gulf. Most birds had departed from the region by the time the water froze shut again.

Air temperatures during the critical periods of early and mid-June of 1960 and 1962 must have approached optimal conditions for breeding birds. Both maximum and minimum daily temperatures averaged higher than long-termed averages of air temperature (Fahrenheit) for Cambridge Bay as given by Thompson *et al.* (1960) and presented in part below:

	May	June	July	Aug.	Sept.
Mean daily maximum temperature	21.6	40.2	54.0	50.1	33.9
Mean daily minimum temperature	7.2	28.6	38.8	38.1	26.5
Mean daily temperature	14.4	34.4	46.4	44.1	30.2
Highest recorded temperature	45	72	*75	76	58
Lowest recorded temperature	**—31	6	30	16	7
Mean number of days with freezing temperature	31	20	1	4	24

*75° temperature recorded at Cambridge Bay on July 18, 1960.

**Lowest January temperature recorded at Cambridge Bay —63°.

Mosquitoes were flying at Cambridge Bay in 1960 as early as June 24 but were not out in force until June 28. We recorded them for the last time that year on July 24. They were by no means troublesome every day during this period; nor were they uniformly abundant over the tundra, many places having few if any of them. Mosquitoes emerged on Jenny Lind Island in late June of 1962 but were not troublesome during our stay. They caused some discomfort at Cambridge Bay when we returned there on July 5. They flew that year until mid-August.

Precipitation

Typical of the latitude in the Arctic Archipelago, the annual total precipitation for Cambridge Bay averages only five to six inches a year. Of this, about two and a half inches falls as rain, chiefly during July and August. The remainder falls as snow, principally during October, November, and January, the total snowfall being about 30 inches (equivalent to three inches of water). Long-term averages for Cambridge Bay are given in part below:

	May	June	July	Aug.	Sept.
Mean amount of rain (inches)	0.01	0.19	1.10	0.92	0.36
Mean amount of snow (inches)	2.70	2.60	trace	0.10	2.70
Total water (inches)	0.28	0.45	1.10	0.93	0.63
Days of measurable rain	*	4	7	6	3
Days of measurable snow	5	2	*	*	3

*Average less than 0.5 days.

Unusually heavy rainfall may be disastrous to nestlings at critical times of their development. Rainfall was higher than usual during July and August of 1960. Of the total rainfall of 1.48 inches that fell in July, 1.05 inches fell during a five-day period (July 26-30). Many young birds were large by this time and survived the wet spell, but Snowy Owls less than two weeks old perished at several nests when their down became saturated. The temperatures were not unduly cold. The highs and lows vacillated between 38° and 45°F. It is the combination of cool and wet weather that makes for lethal conditions. Inclement weather of this sort can be fatal to insectivorous species also (*see* Sutton and Parmelee, 1954).

Relative Humidity

Long-term averages of relative humidity for Cambridge Bay are given in part below:

Relative humidity	June	July	Aug.	Sept.
maximum	93	93	95	95
minimum	84	77	82	84

Winds

Summer winds are chilling in southeastern Victoria Island but are not often severe. The prevailing wind the year-long is from the west, winds in general averaging 11.8 miles per hour. The prevalent wind direction during June, July, and August is from the north, with an average wind speed of 12.2, 12.4, and 12.2 respectively. Gusts sometimes occurred in the vicinity of Mount Pelly, but no exceptional winds were encountered by us.

Principal Nesting Habitats

Much of southeastern Victoria Island is of low, undulating, often monotonous relief, with innumerable bluffs and ridges, many of which are rocky but not high. The only high land of consequence in all the region is Mount Pelly—a mere hill of 750 feet elevation, several miles long. It is called a mountain but is hardly comparable to the mountains of northern Victoria Island. Moderately high land near Ferguson Lake rises as Mount Lady Pelly. Rock debris and erratics are conspicuous and give the terrain a rough and formidable appearance, despite the scarcity of mountains. Characteristic of the landscape are countless ponds and lakes that form virtually a labyrinth of fresh waters in a maze of ridges. The land is greenest near these waters and from the air appears as well-vegetated patches against an otherwise barren and bleak terrain. True desert tundra, as found extensively in the interior and northern parts of Victoria Island, is restricted and local near the south coast. It is the ridge tops there that approach most closely the austerity of the High Arctic. Riverbanks were not important nesting sites in areas observed by us. Although a number of streams flow to the south coast, the only deep river encountered by us was one that flows west from Ferguson Lake to Wellington Bay, here referred to as the Ferguson River.

Jenny Lind Island is relatively flat with a few stony heights of moderate elevation. Less than 20 miles across in any direction, it lies at the mercy of chilling winds that blow almost continually across Queen Maud Gulf or down ice-choked Victoria Strait from the north. Its stunted vegetation is mute evidence to the high-arctic conditions that prevail there. Fewer types of habitats are to be found on Jenny Lind Island, but several of the habitats found there are extensive and favour birds. Fewer habitats still are to be found on the ten or so small islands of the Finlayson group. Elevation approaches 200 feet on one of two larger islands where some of the basaltic rocks form important sea cliffs.

The nesting habitats given below represent the types of terrain used by various species for nest building or egg-laying purposes, not necessarily for rearing of young. They reflect conditions only as we saw them in the present study and may or may not be pertinent to the same species breeding elsewhere. They are not necessarily appropriate ecological divisions for plants, or animals other than birds; nor can they be defined precisely. The edge of one type often blends with that of another, resulting in borders that are not perceptively distinct. They are at best a convenient means for describing the nesting habitats in a general, perhaps meaningful, way. No attempt is made to pigeonhole a particular species to a particular habitat type. Some tolerant species, e.g., the Snow Goose, were found in a variety of habitats, but others were much more confined. Special habitat types not listed here are presented below under Snowy Owl and Water Pipit.

Marine Habitats

Tides along the coasts of southeastern Victoria Island and adjacent small islands are slight with a corresponding narrow beach in most places. At the edge of the active beach, the littered zone of kelp and stones, and beach plants just beyond, provide a restricted but almost unique dry tundra nesting ground of low elevation by the sea. Where found, the Common Eider was most characteristic of this habitat. Baird's Sandpiper occasionally nested near the beach. This type of marine habitat on Jenny Lind Island was an important nesting ground for several species, notably Brant, Snow Goose, Semipalmated Plover, Ruddy Turnstone, Glaucous Gull, Sabine's Gull, Arctic Tern, and Snow Bunting.

Precipitous cliffs rising abruptly from the sea, or just back from the sea, are scarce along these coasts and do not exist at all on Jenny Lind Island. They are sheer and numerous on the Richardson Islands where there is a gullery, and along the coast of Victoria Island north of the Richardson group. A sea-cliff gullery also exists at one of the outer islands of the Finlayson group. Nearly 100-foot cliffs but no gulleries are to be found rising from the sea between Cape Colborne and Back Point, and at the head of Anderson Bay. Less pretentious cliffs occur but a short distance from the sea between Cape Enterprise and Starvation Cove. Presumably there are other cliffs by the sea in southeastern Victoria Island.

Species that nested on these cliff rocks at various levels were Common Eider, Rough-legged Hawk, Peregrine Falcon, Glaucous Gull, Thayer's Gull, Common Raven, and Snow Bunting. The firm ice remaining well into July below these cliffs may account in part for the nearly complete void in alcids.

Marsh Tundra

Marsh tundra is persistently wet mossy and sedgy ground bordering shallow lakes and ponds, near or remote from the marine beaches. It often encompasses a series or network of ponds with innumerable islands and fingerlike peninsulas, some of which are ideal nesting sites for certain species. The ponds and lakes freeze solidly to the bottom each year but are among the first fresh waters to open in June. Although the vegetation is dense and continuous, it is relatively short and provides little nesting cover. The nests of those species breeding in marsh tundra are usually exposed, often conspicuous. This type of habitat is rather confined in the rough country of Cambridge Bay but is extensive on Jenny Lind Island.

The few species found nesting in marsh tundra were the Arctic Loon, Red-throated Loon, Whistling Swan, Canada Goose, Black Brant, Snow Goose, Red Phalarope, Glaucous Gull, Sabine's Gull, and Arctic Tern.

Wet Tundra

Widespread in many areas near and remote from the sea in southeastern Victoria Island and on Jenny Lind Island, wet tundra is an intermediate narrow or fairly wide zone between dry tundra on the one hand and marsh tundra, lakes, and ponds on the other. Typically it consists of well-vegetated hummocky ground, sloping or level, usually wet underfoot. The outer edges and high spots within may dry considerably, though slowly, following the thaw. Rock litter is often present, being a conspicuous element at Cambridge

Bay. Wet tundra is often upgrown to willows of several species. These may be knee high, or higher, forming an extensive but discontinuous woody and leafy canopy in the many favourable situations at Cambridge Bay. On cooler Jenny Lind Island, even the wet tundra willows are stunted and much less conspicuous an element. Widely dispersed plants of the wet tundra are: *Salix reticulata*, *Salix richardsonii*, *Carex stans*, *Eriophorum angustifolium*, *Cetraria nivalis*, *Dryas integrifolia*, *Carex atrofusca*, *Cardamine digitata*, *Pedicularis sudetica*, *Eutrema edwardsii*; also *Arctagrostis latifolia*, *Carex physocarpa*, *Saxifraga hirculus*, *Melandrium apetalum*, *Polygonum viviparum*, *Kobresia simpliciuscula*, *Salix arctica*, and many other less abundant plants.

Whether upgrown to high willows or not, the wet tundra habitat provides the best vegetative cover for a variety of nesting birds. Nests are usually in or on the drier hummocks or mounds, well concealed or relatively exposed from above. Birds that nested commonly in the wet tundra were: Snow Goose, Oldsquaw, King Eider, Willow Ptarmigan, White-rumped Sandpiper, Pectoral Sandpiper, Stilt Sandpiper, Semipalmated Sandpiper, Red Phalarope, Northern Phalarope, Pomarine Jaeger, Parasitic Jaeger, Sabine's Gull, Common Redpoll, and Lapland Longspur. Occasionally Common Eider, Rock Ptarmigan, American Golden Plover, Ruddy Turnstone, and rarely Baird's Sandpiper, nested in this habitat.

Low-Level Dry Tundra

This type of ground, near or remote from the sea, is essentially dry soon following the thaw. Rock litter is usually conspicuous. Sandy areas may be restricted and local (Cambridge Bay) or extensive (Jenny Lind Island). Vegetative cover may be fairly dense and continuous in snowdrift areas that trap moisture, or discontinuous and sparse in more exposed, often snow-free areas, and places where the ground is upheaved or chemically unfavourable. Generally, the vegetative cover is low and matlike, providing little concealment for the many birds that nest there and depend chiefly on cryptic coloration of plumage, eggs, or down, and behavioural patterns. Abundant and widespread plants that characterize this type of habitat are: *Saxifraga oppositifolia*, *Dryas integrifolia*, *Carex rupestris*, *Oxytropis maydelliana*, *Salix arctica*, *Polygonum viviparum*, *Salix reticulata*, *Carex scirpoidea*, *Oxytropis arctobia*, *Astragalus richardsonii*, *Cetraria nivalis*, *Evernia perfragilis*, *Thamnolia vermicularis*, *Braya purpurascens*, *Draba cinerea*, *Caloplaca elegans*, *Pedicularis capitata*, *Poa arctica*, *Pedicularis lanata*, *Carex misandra*, *Kobresia myosuroides*, and *Saxifraga tricuspidata*. At least 25 other plants of lesser importance were identified.

Birds that utilized this habitat for nesting were: Snow Goose, Oldsquaw, King Eider, Rock Ptarmigan, Semipalmated Plover, American Golden Plover, Black-bellied Plover, Ruddy Turnstone, Baird's Sandpiper, Stilt Sandpiper, Buff-breasted Sandpiper, Sanderling, Long-tailed Jaeger, Snowy Owl, Horned Lark, Lapland Longspur, and Snow Bunting; occasionally, Willow Ptarmigan and Semipalmated Sandpiper; probably, Knot.

High-Level Dry Tundra

Barren stony ridges, the tops and often the sides of which have but meagre plant cover, contribute much to the physical terrain of southeastern Victoria Island and adjacent small islands. Ridge systems are especially conspicuous

at Cambridge Bay, being much more confined, though prominent, on Jenny Lind Island. They are almost everywhere uniformly low and generally not precipitous. A few small cliff-like bluffs occur inland between Wellington Bay and Ferguson Lake, but even they are lacking in the Cambridge Bay area and on Jenny Lind Island. Of the 30 species of plants recorded on the summit of Mount Pelly, 21 were scarce or rare. The nine commoner plants in order of abundance were: *Saxifraga oppositifolia*, *Dryas integrifolia*, *Polygonum viviparum*, *Carex rupestris*, *Thamnolia vermicularis*, *Cetraria nivalis*, *Evernia perfragilis*, *Alectoria nigricans*, *Arenaria rubella*. Except at a few wettish depressions, these plants were thinly scattered and were probably representative of this type of habitat.

Characteristic nesting birds of the dry ridges were: Snow Goose, Rough-legged Hawk, Rock Ptarmigan, Semipalmated Plover, Black-bellied Plover, Knot, Baird's Sandpiper, Stilt Sandpiper, Long-tailed Jaeger, Snowy Owl, Horned Lark, and Snow Bunting; occasionally the American Golden Plover and Lapland Longspur; rarely Oldsquaw.

Deep Lakes

Throughout southeastern Victoria Island are numerous deep lakes of various depths and sizes. These lakes do not freeze to the bottom and may maintain fish, principally trout. Though well-defined shore leads form by the middle of June, the fresh-water ice persists as a nearly continuous offshore cover into July. Slopes rising from the lake shores may be well vegetated or barren, as may the nearly inaccessible islets and islands found in many of these lakes. Yellow-billed Loons nested exclusively on these islands, but other species, notably Arctic Loon, Black Brant, Oldsquaw, Glaucous Gull, Sabine's Gull, Arctic Tern, and occasionally the Canada Goose, also nested on the main shores but in lesser numbers. Deep lakes were not observed anywhere on Jenny Lind Island.

Artificial Environment

The artificial environment includes all areas settled or disturbed by humans. Native villages and fishing and trapping sites modify the natural setting, but the greatest changes come with the advent of airstrips, roads, buildings, storage depots, dumps, towers, and antennas, to mention a few. Profound changes of this sort have taken place on Jenny Lind Island and at several widely separated areas in southeastern Victoria Island, but especially at Cambridge Bay where much diverse human activity has taken place. It may be said that the vast tundra immediately beyond the disturbed areas remains wild with respect to most bird populations. A few species, notably swans and geese, nest farther and farther from the edge of activity and will continue to do so until spring hunting pressure is relaxed.

Some birds, the Rock Ptarmigan, Baird's Sandpiper, Horned Lark, and Lapland Longspur, for example, appear to be oblivious to change and occupy disturbed areas as they would wild areas. Certain other species thrive under artificial conditions which may provide a superabundance of nest sites. In such an environment their numbers may be more concentrated than elsewhere. To this category we assign the Semipalmated Plover and Snow Bunting, and tentatively the redpolls.

Taxonomic Considerations

The authors follow the Fifth Edition of the American Ornithologists' Union *Check-List of North American Birds* (1957) with the following deviations: Pacific Brant are here considered to be conspecific with Atlantic Brant and listed as *Branta bernicla nigricans*; "Lesser" Snow Geese and "Blue" Geese are considered colour phases of the race *Chen caerulescens caerulescens*; the original status of Thayer's Gull is retained as *Larus thayeri*.

The taxonomic status of certain charadriiform birds remains unsatisfactory. In recent years several ornithologists have called attention to this problem and have taken steps to amend it. We are especially sympathetic with Drury (1961) in his effort to place the Black-bellied Plover in the genus *Pluvialis*—probably its rightful place. Differences depicted by Drury in the behaviour and social organization among certain members of the *Calidris* complex,¹ especially with reference to *bairdii*, *fuscicollis*, and *melanotos*, have been noted by us and others also. Our studies to date, however, indicate that within the group are many similarities in the breeding behaviour which tend to bind together members of this genus and certain members from other genera. To this assemblage we would add the so-called monotypic genus *Micropalama*, having had some experience with it on Victoria Island, Jenny Lind Island, and at Hudson Bay. This sort of lumping is nearly in accordance with conclusions reached earlier by Holmes and Pitelka (1962, 1964). We agree with them that taxonomic changes within this difficult group of birds should be delayed until the total picture is better understood following critical studies of the breeding behaviours.

¹The authors follow British Ornithologists' Union (1952) usage of the genus *Calidris*.

Methods

Weights up to 100 gm were taken to 0.5 gm, above 100 gm to 1.0 gm only. Wing chord, tail, bill, tarsal, gonad, and ovum measurements were taken with calipers and a millimetre rule; measurements up to 100 mm were taken to 0.5 mm, above 100 mm to 1.0 mm only. Egg shell measurements, and in some cases bill measurements, were taken to 0.1 mm with vernier calipers. Flattened wing measurements were taken by straightening and pressing the primaries flat along a millimetre rule so as to obtain the greatest length possible. Measurements were taken for both wings, the greatest length being recorded. Wingspread measurements were taken from wing tip to wing tip with both wings extended out as far as possible; likewise, body length was taken from tip of bill to tip of tail. Exposed culmen measurements were recorded as the distance from the edge of feathering to tip of bill.

The term 'early May' (or 'early June', and so on) here means the first ten days of the month; the term 'mid-May,' means the second ten days of the month; the term 'late May,' means the last ten or eleven days of the month. Thus mid-July does not necessarily mean July 15; it means July 11 to 20.

Terms 'common' or 'abundant' connote the idea that a species can be found in its proper habitat in many places. It may be rightly assumed that some widespread species can be found at times in many places beyond where they are actually known to exist in a strange country. With further research this has often proved to be the case. Other species may be common in one place but decidedly uncommon even a few miles away. We attempted to evaluate the situation at each place visited, taking into account the many conditions, such as time of year.

Species that did not occur in many places over wide areas and were seldom seen, even when looked for in the right places, were considered 'uncommon.' Some species, truly uncommon by nature or otherwise, were highly local or conspicuous, giving the illusion of abundance. The 'scarce' or 'rare' species were scattered very thinly over wide areas and may or may not have bred in the region. Those birds that somehow drifted into the region, and probably did not breed, we considered 'accidentals.' Those that simply were migrating when seen were called 'transients,' whether they were from close by or from afar. Those that lacked substantial evidence of their very existence in the region were placed in our 'hypothetical list.'

We did not attempt to estimate the total number of birds for southeastern Victoria Island nor to estimate the total number of individuals of any species for the region. Some effort was made to estimate the breeding density of certain species within a limited area, from an acre of tundra to a hundred or more acres, and in a few cases, from even larger areas. Where birds bred

in compact colonies as on a small island or sea cliff, a total count was made. On small Jenny Lind Island an attempt was made to estimate the breeding population as a whole for a few conspicuous species based on observations taken from the eastern part of the island.

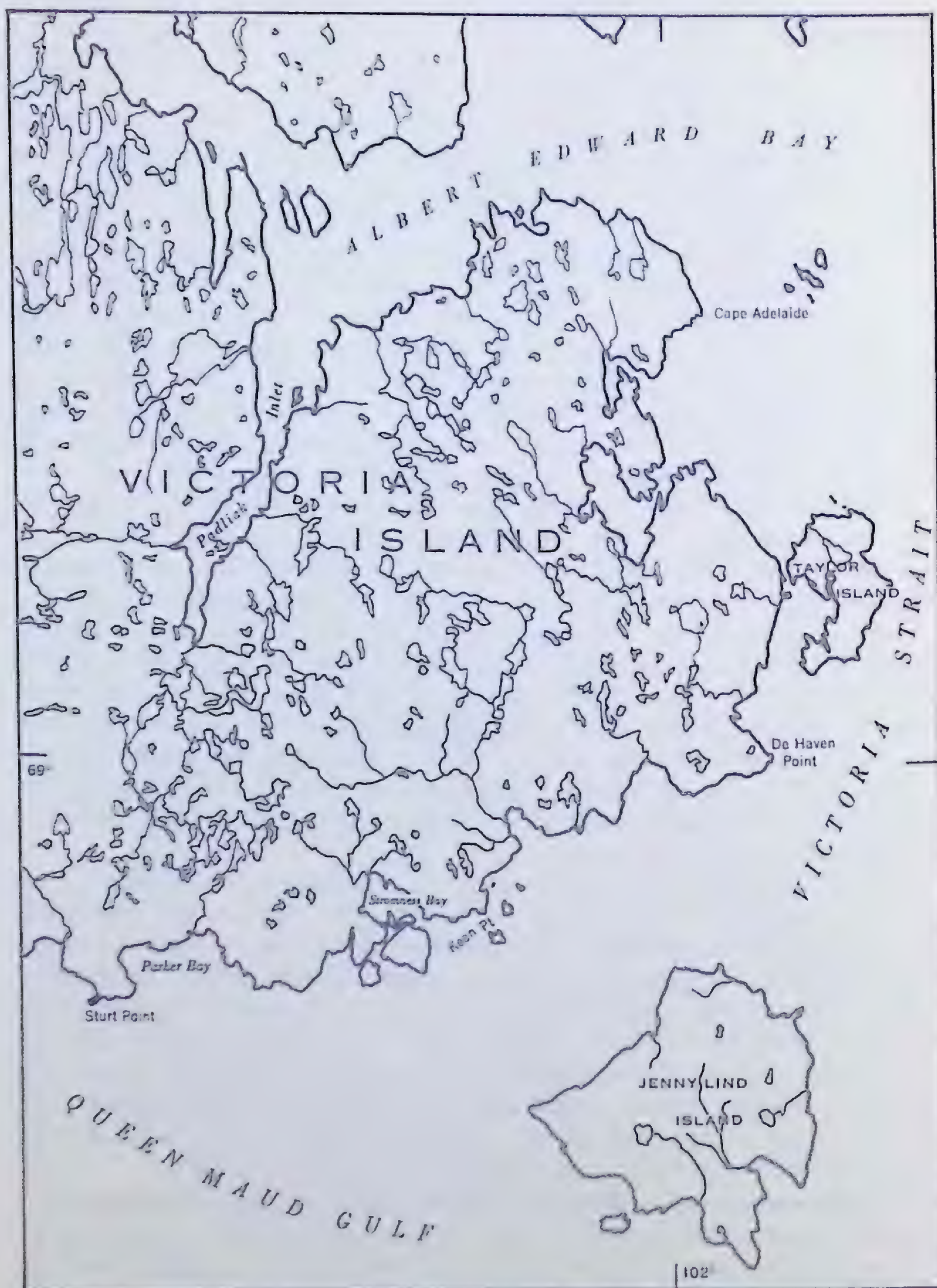


FIGURE 2—Map of southeast coast of Victoria Island and Jenny Lind Island.

Specimens

In 1960 and 1962, 795 birds and egg sets were collected by the authors and Sutton in southeastern Victoria Island and on adjacent small islands. Of the 655 skins (representing 51 species) collected, 523 skins (45 species) are from the Cambridge Bay – Mount Pelly area; 83 skins (30 species) from Jenny Lind Island; 16 skins (six species) from the Finlayson Islands and adjacent waters; 12 skins (eight species) from the Anderson Bay area; 9 skins (eight species) from the Augustus Hills and Starvation Cove areas; 6 skins (four species) from the Wellington Bay area; 3 skins (two species) from approximately 69°43' N, 108°25' W; 3 skins (one species) from Ferguson Lake. Ten pipped eggs (eight species) were collected at Cambridge Bay and preserved in alcohol. Of 130 sets of eggs (representing 34 species),¹ nearly all with nesting material, 71 sets (23 species) were collected in the Cambridge Bay – Mount Pelly area; 48 sets (19 species) on Jenny Lind Island; 11 sets (three species) on the Finlayson Islands. Most of the above specimens are housed in the National Museum of Canada, in the Sutton Collection at the University of Oklahoma at Norman, and in Kansas State Teachers College at Emporia.

Twenty-two small mammals were collected and preserved as skins with skulls at Cambridge Bay by the authors in 1960 and are housed for the most part at Kansas State Teachers College.

Approximately 967 plant specimens were collected by Stephens in 1962. In the Cambridge Bay – Mount Pelly area about 769 specimens (representing 168 species) were collected: algae and fungi, 12 specimens (three species); lichens, 50 specimens (17 species); mosses, 52 specimens (19 species); liverworts, 10 specimens (two species); ferns, 20 specimens (two species); equisetum, 35 specimens (two species); grasses, 70 specimens (16 species); sedges, 110 specimens (20 species); rushes, 20 specimens (three species); dicots, 390 specimens (84 species). On Jenny Lind Island 198 specimens (35 species) were collected: fungi, 8 specimens (two species); grasses, 5 specimens (one species); sedges, 5 specimens (one species); rushes, 5 specimens (one species); dicots, 175 specimens (30 species).

A representative collection of the above plants is housed in the National Museum of Canada. Those species new or of special importance to the Victoria Island flora are included in Porsild's (1964) revised *Illustrated Flora of the Canadian Arctic Archipelago*. Less complete collections are in the herbariums of the University of Oklahoma at Norman, University of Kansas at Lawrence, and Kansas State Teachers College.

Additional specimens were collected on Jenny Lind Island in 1966 (see Supplement, p. 215).

¹Egg sets collected by Waters at Cambridge Bay in 1960 are neither included here nor under individual species (Specimens) listed below.

Systematic List of Birds

Gavia adamsii (Gray) Yellow-billed Loon

Yellow-billed Loons occur all along the coast of southeastern Victoria Island where a fair number feed in summer. Inland they are locally abundant at the larger and deeper lakes which provide suitable nesting islands or food. Less evenly dispersed inland than the somewhat commoner Arctic Loons, they are more abundant than Red-throated Loons.

In 1960, on August 7, adults were seen at several places near the coast from Anderson Bay east to $102^{\circ}20' \text{ W}$. On August 8, many miles inland northwest of Wellington Bay, a pair with two young was seen from the air at $69^{\circ}5' \text{ N}$, $109^{\circ}10' \text{ W}$, and one adult with two young at $69^{\circ}42' \text{ N}$, $108^{\circ}50' \text{ W}$. Barry did not observe the species beyond $71^{\circ}8' \text{ N}$, $106^{\circ}54' \text{ W}$ (two birds) while flying north from Cambridge Bay to Hadley Bay on August 9.

These loons appeared to be equally abundant in the Cambridge Bay area in 1960 and 1962. On Jenny Lind Island in 1962 they were decidedly scarce. The only ones noted there were two adults swimming together in a coastal shore lead on June 28 (*see* Supplement, p. 216).

Previous Records

Not reported by early explorers and many later observers, the Yellow-billed Loon probably was seen in southeastern Victoria Island by Captain Joseph Bernard, according to R. M. Anderson (note on file in National Museum of Canada). Porsild (1951) noted the species on most fresh waters visited by him in 1949, including lakes in southeastern Victoria Island. It was noted but once by Fraser (1957), who saw it at Cambridge Bay (Long Point) on June 11, 1955. It is difficult to understand why so conspicuous a loon has been generally overlooked, especially at the coast, unless it was scarcer in earlier times. There are a few specimens from the Victoria Island region in the National Museum of Canada. Notable among these is an unsexed juvenile (Prince of Wales Strait, September 23, 1916).

Arrival

More than likely the Yellow-billed Loons that breed in Canada migrate along the Alaskan coast from the Pacific wintering grounds, and the first birds probably reach the Canadian Arctic some time in late May. On the open water south of Cape Kellett, Banks Island, they have been noted as early as May 26 (Manning, *et al.*, 1956). Our earliest date for Cambridge Bay is June 9 (single bird flying east near head of bay in 1962), but the species has been seen at Ferguson Lake as early as June 5 (*see* Mortality below). Although the migration of Yellow-billed Loons along the Alaskan coast



August 3, 1960. Pair of Yellow-billed Loons near nesting island in deep lake below Mount Pelly. A second pair had a nest on another island at the far end of the lake.

continues as late as June 19 (Bailey, 1948), some pairs are already established inland near Cambridge Bay by then, despite the fact that most of the deep lakes occupied by them are frozen over.

The icy shores, including those of islands, are the first to open in these deep lakes, and the narrow shore leads are wide enough to provide access to the deeper waters below the firm ice. On several occasions loons were noted in the open edge of deep lakes near Mount Pelly during June 15 – 17. When approached the birds usually dove, surfacing again some distance down shore. One loon dove and swam beneath the thick ice at the narrow end of a lake and surfaced near the opposite shore two hundred yards away.

Nesting

At least two pairs of Yellow-billed Loons bred near Mount Pelly in 1960. That year Waters found two nests there on fairly large islands (150 – 200 feet long) at opposite ends of a single lake, approximately one and a half miles long by three-quarters of a mile at the widest point and 30 feet deep in places. Solid ice covered most of this lake when egg-laying began, probably by June 22. By the end of the month the ice was breaking rapidly and was completely gone by July 10.

One of the nests held two eggs when first seen on June 30. This set was then collected by Waters, who reached the island by means of a strip of

ice. The eggs, close to fairly deep water, were on "turf from which grass had been removed." He estimated that the eggs had been incubated since about June 25. According to Waters, who continued his observations until July 9, the parent birds did not desert but repeated nesting on the same island. Although he did not actually see the second nest, this seemed to be the case, for upon visiting this island by boat on July 10 (8:00 A.M.), we found a fresh nest with two eggs on the opposite side of the island from the location of the first nest. On July 31 (2:00 P.M.) the eggs were warm but not pipped. On August 2 (11:00 A.M.) there was one complete egg only; it contained no embryo and it had been deserted. As expected, shell fragments were also in the nest, for earlier that day a downy chick accompanied by both adults swam from the island. Allowing 29 days for incubation—the period (*see* Palmer, 1962) ascertained for *Gavia immer*—incubation must have commenced as early as July 3, certainly no later than July 4! If this was the case, the birds repeated surprisingly soon, or the period of incubation was much less than anticipated.

This second nest was structurally quite different from the first.¹ It was composed of wet peat completely wreathed with fresh green willows, situated about two feet from water only three to four inches deep. Although it seems most unlikely that two pairs occupied the island, especially since the incubating birds would have been in view of one another, it must be admitted that as many as seven adult Yellow-billed Loons were seen at one time swimming in this west end of the lake on August 3 that year.

From a blind placed on the nesting island we watched one of the adults (probably the female, since it was the smaller of the two) brood the small young during the dim, cool hours of August 2–3. She brooded the chick on turf several feet back from the main shore, leaving it at times to join the male close by in swimming, diving, and much calling. At one point the pair flew off and were gone for fifteen minutes, the female returning first, later followed by the male. She immediately returned to the same spot and brooded. Some time during August 3, the chick disappeared, not to be seen again. Presumably it was caught by some predator.

The nest found by Waters at the opposite or east end of the lake held one egg on July 5; the second was laid some time on the 7th. The nest, first described by Waters and later seen by us, was most remarkable. The "Turf had been removed from the peat and the flat space was completely covered with small pellets of grass and peat rolled by the birds in some way, or perhaps formed in the bird's beak." The nest, close to deep water, was eggless when first checked by us, and it is assumed that the eggs had been destroyed by a predator.

Only one pair of Yellow-billed Loons resided on the lake in 1962, although several pairs were heard from lakes northwest of Mount Pelly. We saw one adult swimming near the nesting island (west end of lake) on July 8, at which time strong winds blew the remaining sheets of ice hard against the shore, preventing use of a boat. But on July 18, Sutton and Stephens reached

¹The fact that there were two different types of Yellow-billed Loon nests on the same island does not necessarily suggest that they were constructed by two pairs of birds. Individuals of some species, e.g., the Painted Bunting (*Passerina ciris*), may construct entirely different types of nests in cases of additional nestings during the same season.

the island and found the nest (unlined depression in turf close to deep water) with two eggs, one pipped. These eggs were placed in an incubator, the first hatching on July 19, the second on the 21st. Allowing 29 days for incubation, these eggs must have been laid on or before June 20 and 22 respectively.

In the past at least one other of the ten islands in the lake was used by loons. Several old nests, some upgrown to moss and other vegetation, contained bits of egg membrane and shell fragment, well preserved and identifiable. Judging from the plant growth and the depth of the fragments in the peat, some of the nests must have been very old. One fairly recent nest of another year was four feet from water.

No other species of loon was ever observed on this lake, but Black Brant, Oldsquaw, Sabine's Gull, and Arctic Tern nested on the very islands occupied by the loons. Glaucous Gulls bred on islands close by.

Voice and Attitudes

Calls of the Yellow-billed Loon are stated to be similar to but louder and less frequent than those of the Common Loon (*Gavia immer*). We, also, believe that the calls are very similar and likewise of four basic types, notably the laughing calls or tremolo, the highly variable yodel, the wails or long calls, and the talking or communicative utterances of simple syllabled notes between birds of a pair or among those of a flock (Olson and Marshall, 1952). It was our experience, however, that Yellow-billed Loons are anything but silent birds and that their calls are repeated as frequently as those of the Common Loon. It is difficult to determine whether one species actually calls 'louder' than the other.

From the breeding places near Mount Pelly we often heard the piercing laughter, the oft-repeated yodels, and the talking. Of these we have nothing new to add. The wails we heard less frequently. These have been described for the Common Loon as usually consisting of the syllables *ahaa-ooo-ooooo oooo-ooo-ahhh* with variation. Their use is not well understood; but they may function as 'contact' notes in summoning mates or young or may express great anxiety. They may also prefix the tremolo or yodel. Whatever the true function, we clearly heard what probably was a variation of the wail by the Yellow-billed Loon. At one of the feeding lakes near Mount Pelly, during midnight of July 2-3, 1960, the larger of two birds, likely the male, called *ooo-waaah* every 30 seconds or so for nearly a half hour. Its mate, swimming and diving close by, finally flew off, followed by the male some minutes later.

The calls of newly hatched Yellow-billed Loons, taken near Mount Pelly in 1962, were *cheeps* infrequently accompanied by a "long-drawn-out wail" like that of an adult (Sutton, 1963). The calls of Common Loon chicks have been simply described as resembling the peeps of domestic chicks.

The attitudes of 'peering' and the 'rolling preen' described for the Common Loon by Olson and Marshall (*ibid.*) were also characteristic of the Yellow-billed Loons. The latter, in addition, dipped their bills momentarily in water before suddenly thrusting them upwards, giving the impression of drinking or gulping water. This peculiar attitude was commonly observed by us in the Arctic Loon.

Of special interest were the water antics by a flock of three, possibly non-breeding Yellow-billed Loons, near Mount Pelly on August 4, 1960. The birds not only called aloud and gulped water but also splash-dived remarkably like playing Arctic Loons (see *Gavia arctica*, p. 29).

Mortality

Although adult Yellow-billed Loons probably have few natural enemies, the Eskimo kills them for food whenever it is convenient for him to do so. More significant is the fact that a number of them are killed accidentally each year in fish nets placed in bays or rivers near the coast, less often at large inland lakes. In 1960 we observed the following dead adults that had been caught in nets at Cambridge Bay: male and female on August 1; female on August 7; two males and a female on August 22; male on August 25. Many more must have perished in this manner, for we checked relatively few nets.

During the summer of 1962, Mr. J. G. Hunter of the Fisheries Research Board of Canada reported that his party had caught a number of these loons at Ferguson Lake. An adult found alive in a fisheries net as early as June 5 had been set free.

It seems likely that eggs and particularly small young suffer a fairly high mortality. Losses of this type were noted at the nesting lake near Mount Pelly in 1960, but they were not observed firsthand.

Specimens

Of eight adult male Yellow-billed Loons, four were salvaged from fish nets at Cambridge Bay in 1960 during August 1-25, two were collected at Anderson Bay in 1960 during August 20-21, and two were salvaged at Ferguson Lake, one each on June 17 and August 28 in 1962. Weights (gm) and measurements (mm) of the eight are as follows: weight 4,000 to 5,329 (av. 4,660.55), flattened wing 382 to 395 (387.12), tail 62.0 to 70.0 (65.43), exposed culmen 86.0 to 95.0 (92.0), tarsus 89.0 to 95.5 (92.87). Body length (bill tip to tail tip) for three birds was 838 to 873 (854.03); wingspread for two birds was 1,463 to 1,536. Colours of soft parts: eyes rich chocolate brown with reddish cast; inner side of tarsi and feet, including upper surface of webs, pale flesh; outer side of tarsi, joints, and under surface of webs greyish to nearly slate. Right testis in six males was extremely small or absent. None of the eight was moulting.

Of five adult females, three were salvaged and one was collected at Cambridge Bay in 1960 during August 1-22, and one was salvaged at Ferguson Lake on September 3, 1962. Weights and measurements of the five are as follows: weight 4,025 to 4,825 (4,344.82), flattened wing 369 to 381 (374.8), tail 62.0 to 70.0 (65.1), exposed culmen 83.5 to 96.5 (90.6), tarsus 85.0 to 92.0 (90.4). Body length for four birds was 774 to 831 (792.15). Colours of soft parts were similar to male. None of the five was moulting.

One male and one female downy sibling from eggs taken near Mount Pelly on July 18, 1962, and hatched in an incubator respectively on July 19 and 21, have already been described by Sutton (*ibid.*).

One egg (no embryo), salvaged at an abandoned nest near Mount Pelly on August 3, 1960, measured 92.1 by 53.1. Its shell and those of all other Yellow-billed Loon eggs noted by us were dull, not glossy.

Annual Breeding Cycle

Some Yellow-billed Loons return to southeastern Victoria Island in early June, the majority probably in mid-June. Early arriving birds go inland immediately and occupy the narrow shore leads of deep, ice-covered lakes which, when islands are present, are the favoured breeding places. Egg-laying starts by June 20 or earlier and probably culminates before the end of the month, declining rapidly in early July when the firm ice breaks up on the lakes. More than one pair of Yellow-billed Loons may breed on the same lake. The two eggs are laid in nests that may be simple scrapes or elaborate structures within four feet of deep or shallow water. Young, attended by both parents, hatch as early as July 19, the majority probably in late July. Fledging time is not known for the region, but young likely remain well into September, depending on ice conditions. Although the Yellow-billed Loons commonly feed inland at deep lakes containing fish, they are most conspicuous along the coast where, probably, both breeding and non-breeding birds in adult plumage, but apparently not year-old birds, occur. It is near the coast where significant numbers of these and other loons die each year in Eskimo fish nets.

Gavia arctica (Linnaeus) Arctic Loon

Although not truly abundant, this species is the commonest loon at Cambridge Bay and perhaps elsewhere in southeastern Victoria Island where pairs are thinly scattered at inland waters. A few pairs also breed on Jenny Lind Island where the species is less abundant than the Red-throated Loon. Arctic Loons inhabiting these regions belong to the race *Gavia arctica pacifica*.

In 1960, we noted the species inland several times from the air between Cambridge Bay and Albert Edward Bay on August 7; on August 9 that year Barry noted it as far north as Cape Stang ($71^{\circ}22'N$) on the east coast.

Previous Records

Ellis (1956) stated that Arctic Loons were common near Cambridge Bay where he noted an adult with one young on August 14, 1954. Fraser (1957) considered them the most common of loons in southeastern Victoria Island in 1955. He saw them on numerous occasions at Ferguson Lake.

Arrival

Arctic Loons, presumably migrating eastward along the Alaskan coast in mid-May, reach western sections of the Canadian Arctic by early June and eastern sections by mid-June (Snyder, 1957). The earliest date given by Manning, *et al.* (1956) for Banks Island is June 10. On Victoria Island, in 1960, we noted a solitary bird swimming in a partly thawed lake near Cambridge Bay on June 13. In 1962, a solitary bird flew up from the open

edge of a lake near Cambridge Bay, mostly frozen over on June 11. Paired birds were first noted there on June 12. According to Gunn (*in* Palmer, 1962), there is some tendency for this species to migrate in pairs.

These loons could be found at certain lakes inland from Cambridge Bay almost any time after June 15. As late as June 20 (1960) a solitary male was collected in an open lead of Dease Strait far from land. This bird may have been migrating. No loons of any species were noted swimming in leads or flying over the sea ice between Cambridge Bay and the Finlayson Islands during June 3-4 in 1962.

Nesting

In southeastern Victoria Island, Arctic Loons were mostly observed on medium-sized lakes that were moderately deep. The pairs were solitary, and at no time were they seen inland with other species of loons (*see* Supplement, p. 216). Waterfowl of several kinds, terns, and gulls occupied their breeding lakes, and in one instance Sabine's Gulls and Arctic Loons used the same nesting island. At the coast the species was more or less concentrated in the shore leads where it commonly fed and associated with other loons from mid-June until the sea ice broke up in August. Following break-up, it also could be found far out in the nearly open marine waters, probably until freeze-up. The largest number seen at the coast at one time was seven (Jenny Lind Island, June 27). Birds nesting far inland often flew to the coast to feed, but they also fed in the larger lakes containing fish.

The nests were scrapes in wet turf close to the edge of a small island or peninsula of low land extending out into the water. Some of the nests seen were fairly large structures of peat, moss, sub-surface plant stems, and decomposed aquatic vegetation.

In 1960, Waters found a nest with one egg (later deserted) near Cambridge Bay on June 24. Near Mount Pelly on July 3 he collected a set of two eggs estimated to have been incubated three to five days; in the same region he collected another set of two, estimated to have been a week old on July 7. On July 11, we collected a set near Cambridge Bay, both eggs containing small embryos less than a week old. On July 2, 1962, we collected a nearly fresh set of two on Jenny Lind Island. Near Mount Pelly that year we noted a nest with two eggs on July 8; the eggs were not pipped when last seen on July 18.

Newly hatched young (collected) were noted near Cambridge Bay as early as July 19 in 1960. Allowing 29 days for incubation (*see* Zedlitz *in* Witherby, *et al.*, 1958), the clutch at this nest could not have been completed later than June 19. Other young recorded in the Cambridge Bay region in 1960 were a pair of adults with two small downies on August 2 and another pair with two small downies on August 4.

In 1962, at a lake near Cambridge Bay, Stephens collected one of two young estimated to have been two or three days old on July 25. Presumably its sibling was noted several times at the same lake by Sutton. Still attended by at least one adult as late as September 9, the young on that date was "gray, not as large as the adult" and had "stubby" wings. No loons were seen at the lake, or lakes near by, on September 12, and it was assumed that the

young had fledged. The period of fledging, consequently, was at least 46 days and probably not more than 53 days. A fledging period of 60 days has been ascribed to the species (*see* Witherby, *et al.*, 1958).

Other young recorded in the Cambridge Bay region in 1962 by Sutton and Stephens included the following: a pair with two young on August 2; a pair with one young on August 24; two young unaccompanied on August 24; four birds, probably a pair with two young, on September 1.

Non-breeding adults were noted inland from Cambridge Bay. Two and sometimes three birds, seemingly the same individuals each time, were noted at a fairly large lake on eight different occasions from July 13 to August 9 in 1960. There the birds splash-dived for 15 or more minutes. While one or two remained motionless, the other suddenly stood high in the water and then belly-flopped with partly spread wings, disappearing with a loud splash. The other bird or two performed similarly in turn. A sharp yelp resembling *oich* preceded each dive; otherwise, the birds produced hoarse growling notes resembling *crouw* and *kee-arr*. Between dives they occasionally dipped their bills in the water and then lifted them high, as though drinking. Splash-diving of sorts by four birds was also noted near Cambridge Bay on August 23, 1962, by Sutton; by six birds on Baffin Island on August 8 by Sutton and Parmelee (1956a); by four birds in the post-nesting season in Scotland by Thomson (1947).

Departure

Arctic Loons depart from the Canadian Arctic in September, the movement usually being completed before October (Snyder, *ibid.*). September 9 is our latest date for the species at Cambridge Bay (adult and nearly fledged young seen by Sutton in 1962).

Mortality

Like other loons, this species is accidentally caught in fish nets near the mouths of rivers or in bays at the coast. According to the Eskimo, a good number perish each year. Eskimos occasionally shoot these birds for food. In late July of 1960, we examined several that had been caught in nets and one that had been shot.

Specimens

One adult male Arctic Loon (weight 1,950 gm, flattened wing 301 mm, tail 59.0, exposed culmen 55.5, tarsus 76.0) was collected in Dease Strait southwest of Cambridge Bay on June 20, 1960.

One adult female (weight 1,800, flattened wing 293, tail 53.0, exposed culmen 46.5, tarsus 72.0) was collected at Cambridge Bay on July 19, 1960.

Three downy young were collected at Cambridge Bay: male (weight 62.0, exposed culmen 9.5) and female (weight 73.0, exposed culmen 11.0) siblings in 1960 on July 19; female (weight 82.0, exposed culmen 11.5) in 1962 on July 26. Colours of soft parts of both sexes: eyes brown; bill, legs, and feet slate grey.

Two sets of two eggs each were collected: one at Cambridge Bay on July 11, 1960, and one on Jenny Lind Island on July 2, 1962. The four eggs measured: length 69.6 to 71.8 (av. 70.7), width 45.5 to 47.1 (46.32). The ground colour of one set is sepia, that of the other, pale olive green.

Annual Breeding Cycle

Arctic Loons probably arrive at the Victoria Island breeding lakes in mid-June, the earliest known date for single birds at Cambridge Bay being June 11, for paired birds June 12. These loons for the most part occupy medium-sized lakes, some of which are partly open by arrival time. Although they associate freely with one another and with other species of loons at coastal shore leads, the pairs are solitary at the breeding places inland. Egg-laying starts in mid-June, probably culminates in late June, and continues into early July. Hatching starts in mid-July, most eggs probably hatching in late July, some probably in early August. Both sexes incubate and share in care of young. Some young fledge when 46 to 53 days old. Year-old birds have not been recorded inland or at the coast. The latest known date for adults and young inland at Cambridge Bay is September 9, but some birds likely remain until the waters freeze shut.

Gavia stellata (Pontoppidan) Red-throated Loon

Red-throated Loons appear to be uncommon in southeastern Victoria Island where a few scattered pairs breed. On Jenny Lind Island they are the most common loons.

During the 1960 waterfowl survey of August 7-9, these loons were observed from 109° W eastward to Collinson Peninsula. The largest number seen then was at Albert Edward Bay (15 birds). According to Barry, they were the only loons seen at Hadley Bay on the north coast (three birds, August 9). So scarce were they at Cambridge Bay that year that Waters failed to note them anywhere in the region where we saw them occasionally. They were equally uncommon in 1962.

Previous Records

Two eggs (in British Museum) of the Red-throated Loon were collected at Cambridge Bay in 1853 by members of H.M.S. *Enterprise* (Oates, 1901). "Adults with single young" were seen near Cambridge Bay in 1954 by Ellis (1956), but the species was not listed at all by Fraser (1957) who visited many places in southeastern Victoria Island in 1955.

Arrival

The Red-throated Loon was not observed by us in 1960 before June 20, when our Eskimo guide shot one in a narrow lead far out in Dease Strait. Inland from Cambridge Bay in late June it was noted on the 25th (one flying), 29th (one flying), and 30th (two widely separated birds swimming).

In 1962, a pair was noted inland near Cambridge Bay on June 16. Pairs were well established at the breeding places on Jenny Lind Island on June 19. Manning, *et al.* (1956) state that Red-throated Loons are the last of the family to go inland on Banks Island, early dates being June 13-15, a late date being June 23 (*see* Supplement, p. 216).

Nesting

The one nest observed in the Cambridge Bay area was on an islet in a shallow pond, within a quarter-mile of the beach near Cape Colborne. When first seen on August 13, 1960, the nest held bits of shell and one downy young that was badly decomposed. An Eskimo had killed one of two adults at the pond earlier that day. With the two birds was a young loon, likely the sibling of the dead young. We failed to find it.

Although one Red-throated Loon was seen (July 10) at a barren lake in rough country near Mount Pelly, no evidence was found that the species bred in such areas.

In 1962, on Jenny Lind Island, a nest with one egg on June 27 had two eggs on July 1; a second nest with one egg on June 29 had two eggs on July 2; a third had one egg on June 30; a fourth had two eggs on July 2; a fifth had two eggs on July 5. Four of these nests were on islets or peninsulas in shallow ponds; the fifth was on the shore of a shallow, half-mile-long lake. All were muddy structures of moss and decomposed aquatic vegetation barely large enough to hold the two eggs. One was within a foot of an old nest, clearly indicating re-use of an old site.

Jenny Lind Island, with its many networks of shallow lakes and ponds, was ideal for the species, but four pairs to a square mile of marsh tundra appeared to be the maximum density (*see* Supplement, p. 216). The two closest nests seen were about 200 yards apart at different ponds. The breeding birds flew regularly to the coastal shore leads where they fed with other loons and waterfowl.

Mortality

Considering the scarcity of Red-throated Loons in southeastern Victoria Island, a relatively large number of them were caught in fish nets. At Cambridge Bay in 1960, we examined one that had been taken from the nets on July 20, four on July 25, one on July 30, and one on August 2. There were reports of others. At Wellington Bay that year we examined one that had been caught in the Ferguson River on August 27.

In 1962, J. G. Hunter of the Fisheries Research Board of Canada reported that his party had caught a number of loons, including this species, in their nets at Ferguson Lake.

With respect to predation, one observation at the nest on Jenny Lind Island is noteworthy. On June 30, 1962, at a series of sedgy ponds near the coast, our attention was directed to a pair of Parasitic Jaegers that circled low over the ponds. A sudden-appearing Red-throated Loon, flying in fast, hurtled its heavy body straight for the jaegers, barely missing one. The loon entered the water where it remained on guard by its nest. When one of the jaegers attempted to land, the loon, rising high, skipped rapidly along the water towards the predator, bluffing it off. The jaegers eventually left, but not before they had made repeated attempts to reach the nest. During this fracas, the loon paid not the slightest attention to us and finally squatted on the single egg.

Specimens

Three adult male Red-throated Loons [weight 1,700 to 2,000 gm (av. 1,827.0), flattened wing 278 to 298 mm (287), tail 48.0 to 52.0 (50.66), exposed culmen 52.5 to 56.0 (53.43), tarsus 71.0 to 74.5 (72.83)] were obtained: two from a fish net in Cambridge Bay on July 20 and August 2, 1960, respectively, and one (collected) on Jenny Lind Island on June 23, 1962.

One set of two eggs (length 71.1 to 73.4, width 44.3 to 46.0) was collected July 2, 1962, on Jenny Lind Island. The set is remarkably similar in size and colour (pale olive green ground colour) to a set of Arctic Loon collected at Cambridge Bay in 1960.

Annual Breeding Cycle

Little is known of Red-throated Loons in southeastern Victoria Island. Pairs on Jenny Lind Island become established at the breeding places by late June. Although their numbers may be dense locally, the pairs are solitary inland, but not at the coastal shore leads where they commonly feed. The favoured nesting habitat is low-lying marsh tundra with numerous shallow lakes and ponds. Egg-laying commences in late June and continues into July (*see* Supplement, p. 216). It is not known when the young fledge, or when they and the adults leave the region.

***Olor columbianus* (Ord) Whistling Swan**

Whistling Swans are thinly distributed in southeastern Victoria Island where widely scattered pairs breed inland at lakes. About 200 adults and young of the year were observed during the 1960 waterfowl survey of August 7-9. The largest numbers seen were at Albert Edward Bay (98 birds) and Wellington Bay (52 birds). That year Barry did not observe swans beyond 70°30' N during his flight to the north coast on August 9.

At least eight pairs of swans occupied the eastern third of Jenny Lind Island in 1962. These pairs were fairly evenly scattered, and it may be assumed that others, perhaps as many as 16 pairs, occupied the rest of the island. The breeding population on Jenny Lind Island was denser than on any comparable area seen by us on Victoria Island (*see* Supplement, p. 217).

Previous Records

One egg (in British Museum) of the Whistling Swan was collected at Cambridge Bay in 1853 by members of H.M.S. *Enterprise* (Oates, 1902).

Arrival

Swans were first noted at Cambridge Bay in 1960 on June 1 (one bird flying) and at the Augustus Hills in 1962 on June 2 (pair resting). On Banks Island, they were first noted in 1952 and 1953 on May 29 (Manning, *et al.*, 1956).

The newly arrived swans rested and fed in the fast-thawing spots. Some were seen in small flocks, but isolated pairs were noted most often. Single

birds flying erratically at this time were likely the survivors of pairs broken up by Eskimo hunters. On June 10, 1962, we saw the remains of such a kill.

Probably most pairs arrived at the breeding areas in early June. A flying flock of three, likely non-breeding individuals, was noted far from land over frozen Dease Strait as late as June 20 in 1960.

Nesting

Whistling Swans breeding in the vicinity of Cambridge Bay and on Jenny Lind Island constructed their nests on islands or on banks of ponds or lakes. The nests were enormous, being mostly of turf plucked in the immediate vicinity. All were lined scantily with down and feathers.

Probably two pairs of swans bred in lake areas near Mount Pelly in 1960. A pair with four small cygnets was noted there on July 9. At Sturt Point, about 50 miles east of Cambridge Bay, swan eggs hatched on July 3, according to white personnel stationed in the area.

David Koomyuk reported that a pair of swans had a nest and three eggs at a lake near Mount Pelly some time during June of 1961. The eggs were eaten by Eskimos.

Three pairs of swans were observed near Mount Pelly in 1962. The nest of one pair on an island in an open lake (ice on bottom) contained three eggs that were incubated on June 13 by the swan. We had visited this very island that year on June 5—when there was no nest and when the lake was covered with solid ice and the island with snow. No swans were seen that day. The nest had been built from scratch, and three eggs were laid within the eight-day period. Since a party of Eskimos had just established a hunting camp near by, we decided to discourage the swans from remaining by taking the eggs. These proved fresh (no visible embryos).

According to personnel of the Fisheries Research Board of Canada, four pairs of swans were seen in the vicinity of Mount Lady Pelly during June of 1962. They also reported having seen five feathered but flightless young, presumably siblings, near the east end of Ferguson Lake, some time early in September (exact date not known).

On Jenny Lind Island in 1962, a nest with four eggs was found June 20; the four live eggs were in the nest on July 3. Another nest with four eggs and still another with two eggs on June 24 were not checked again.

Departure

Our latest date for swans in southeastern Victoria Island was September 1 (flock of six adults near Cambridge Bay in 1962). No doubt the species occurs there later in the month.

Specimens

Four downy Whistling Swan siblings (yolk visible) were collected a few miles south of Mount Pelly on July 9, 1960. Two were males (weight 146 to 148 gm, exposed culmen 19.0 to 21.0 mm, tarsus 31.5 to 33.0), and two were females (weight 148 to 149, exposed culmen 19.5 to 21.0, tarsus 34.5 to 36.0). The down of the underparts of each was white, but that of the

upper parts was pale to light greyish, especially on crown, back, and rump, being darkest in one of the females. There was, in fact, a strong contrast in down colour between the ventral and dorsal parts of each of the four.

Their eyes were dark brown; the bills, legs, and feet a very pale pinkish flesh colour, similar to that described by Gabrielson and Lincoln (1959). Since preservation, the bills, legs, and feet have turned a pale yellow—a very misleading colour, one that was apparently used by Elliot (*in* Bent, 1925) and by Scott (*in* Delacour, 1954) in describing and illustrating the downy young of the species.

One set of three eggs with nesting material was collected about three miles southwest of Mount Pelly on June 13, 1962.

Annual Breeding Cycle

Whistling Swans return to southeastern Victoria Island in early June, probably also in late May. Pairs soon scatter widely over the inland tundra, building conspicuous nests of turf on islands and banks close to fresh water. Nest construction may take as few as five days or less. Egg-laying starts in early June and continues into mid-June. The clutch size is four eggs, probably also three and five eggs. Young start to hatch in early July. Nothing is known of the fledging period. Adults with young remain in the region into September, but late dates are not known.

Branta canadensis (Linnaeus) Canada Goose

Canada Geese occur throughout southeastern Victoria Island where they are thinly distributed from near the coast to points at least 60 miles inland. They are conspicuous at the coast of Cambridge Bay during migration, but the pairs nest well back from the settled areas.

Barry estimated that at least 2,000 Canada Geese, including young of the year, were noted in southeastern Victoria Island during the 1960 waterfowl survey of August 7–9. The heaviest concentrations seen were at Wellington Bay (508 birds) and Albert Edward Bay (264 birds). Numbers of Canada Geese fall off sharply to the northward; Barry, while flying north on August 9, did not record the species beyond 70° 31' N in eastern Victoria Island.

Good numbers of these geese nest on Jenny Lind Island where the species at times may approach a maximum breeding density with respect to latitude and habitat. Southeastern Victoria Island birds and those of Jenny Lind Island are best referred to the race *Branta canadensis hutchinsii*.

Previous Records

Two eggs (in British Museum) of the Canada Goose were collected at Cambridge Bay in 1853 by members of H.M.S. *Enterprise* (Oates, 1902). Smith and Sutton (1954), investigating a rather extensive area from Cambridge Bay to about the longitude of the Richardson Islands, reported small numbers of Canada Geese on all observed rivers draining to the south coast in 1953. Ellis (1956) reported small flocks of Canada Geese at Cambridge Bay during July and August of 1954. In 1955, Fraser (1957) noted a flock of 70 Canada Geese east of Mount Pelly on May 29 and a flock of 10 at

Albert Edward Bay on June 3; he also reported seeing the species near Anderson Bay on June 4, Cambridge Bay on June 10 and 30, Ferguson Lake on June 17, and Greiner Lake on July 2.

Arrival

Although Canada Geese were present when we first arrived at Cambridge Bay on May 31 in 1960, the birds had not yet settled down on territory. Singles, pairs, and small flocks of three and four birds flew back and forth low above the fast-thawing tundra, often flying out of sight and calling loudly as they went. All appeared to be local birds. Some pairs favoured certain lakes and ponds near Mount Pelly by June 8. Some may already have been laying then, for two geese on nests, with ganders close by, were noted at a large, partly thawed lake. Other pairs flew about unattached.

In 1962, personnel of the Fisheries Research Board of Canada reported a pair of flying Canada Geese as early as May 22 at Byron Bay. A mile south of Mount Pelly, on May 24, we watched a single individual flying over the frozen ground and lakes that were then mostly snow-covered. On May 30, one was seen flying with a White-fronted Goose near Cambridge Bay. Pairs, small flocks, and single Canada Geese were there the following day.

According to the Eskimo, newly arriving geese first visit the Augustus Hills that closely parallel the south coast west of Cambridge Bay. In visiting the hills during June 2-3, we noted numerous low-flying and resting birds—singles, pairs, and flocks of three or four to upwards of fifty birds. A few White-fronted Geese were among the several hundred Canada Geese seen. Obviously the area was favoured by geese. The Eskimo had established hunting camps there each spring for many years. The thaw throughout the hills and narrow adjacent coastal strip was early, being well in advance of that of the low terrain about Mount Pelly and Cambridge Bay. Suitable nesting ponds were nevertheless scarce, and almost certainly the birds soon moved to lake areas farther inland to breed. As in 1960, some pairs were well established at the breeding places near Mount Pelly by the second week in June (*see* Supplement, p. 217).

Nesting

Pairs of Canada Geese nesting near Cambridge Bay and probably elsewhere in southeastern Victoria Island were widely separated for the most part. Of fifteen nests observed in 1960 and 1962, ten were on small islands in shallow ponds. Three were on islands in fairly large, deep lakes, one of which contained two pairs of nesting geese—an apparent exception to the rule of one pair per pond for the region. Two nests were on the banks of large lakes.

At three nests the clutch size was six eggs; at three others it was five. The earliest nest examined (June 13) contained four eggs, indicating that egg-laying had started no later than June 9. Hatching at three nests took place some time between July 2 and 10, indicating early egg-laying.

Of twenty-two Jenny Lind Island nests, nineteen were on small islands near the shore of shallow ponds, two were on narrow points of land extending out into ponds, and one was on the bank of a pond. At five nests the clutch size

was six, at four nests it was five, at two nests it was four, and at two nests it was three. Egg-laying on the average appeared to be at least a week later than on Victoria Island, but most clutches were probably completed by June 24. A nest with two eggs on June 28 and three eggs (complete clutch) on the 29th provided the latest recorded date for egg-laying.

Twelve, possibly more, pairs of Canada Geese bred within a square-mile area near our camp on Jenny Lind Island. This area included isolated ponds as well as great networks of marshy ponds, and both were readily utilized by the geese. The pairs, however, remained apart, no two pairs occupying the same body of water. This concentration, far greater than that observed on Victoria Island, was probably as dense as any on Jenny Lind Island. Pairs also occupied ponds at higher and drier levels, and one pair occupied a small freshwater pond within a hundred yards of the marine beaches.

According to Waters, one goose utilized the old nest of a swan near Mount Pelly in 1960. Otherwise, all the nests seen were rather deep scrapes in the turf, scantily lined with light greyish down mixed with moss and bits of grasses, leaves, and roots. As egg-laying and incubation advanced, a thick cover of down and breast feathers accumulated.

The sitting geese pressed close to the ground with necks straight out or rarely held at right angles to the body. Most of them bolted when approached within thirty yards, but some were reluctant to flush, and one individual was even touched by hand before flushing. Once flushed, the geese usually flew off with the ganders.

Pairs with small downies were noted near Mount Pelly as early as July 9 in 1960 and July 8 in 1962. The family groups did not necessarily remain at the nesting ponds but moved into other areas inland or near the coast. Being wary and fleet of foot, they were difficult to locate except from the air. Isolated pairs with young were noted as late as August 3 (near Mount Pelly in 1960). Thereafter, the species was seen only in larger flocks. Many flocks containing adults and their young were seen from the air during the waterfowl survey flights on August 7 and 8 in 1960. Some of the adults were capable of flight. On August 13 that year, we collected a flying adult (new remiges, heavy body moult) north of Cape Colborne.

It was not determined when the first young fledged, but on August 20, 1960, our Eskimo guide shot four nearly fledged birds from a flock swimming in the waters of Anderson Bay. The four attending adults flew off strongly, and some of the abandoned young escaped by swimming.

Departure

Flying flocks of Canada Geese, some containing as many as 35 adults and young of the year, were conspicuous at Cambridge and Wellington bays in late August of 1960. These flocks flew about near the sea, feeding and resting in wet, grassy meadows and well-vegetated margins of ponds. Some of these birds likely were from afar, for a number of high-flying formations from inland areas followed the larger streams southward to the coast.

Flocks of old and young Canada Geese were observed near the coast of Cambridge Bay in late August and early September of 1962. The largest

flock seen then was one of 40 birds on August 27. Flocks containing nine, seventeen, and twelve birds were noted September 9, but none thereafter. These geese commonly fed in wet, mossy, grassy margins of lakes close to the seashore.

Banding

By inquiring about geese among the Eskimo hunters at Cambridge Bay, we uncovered three bands, each of which had been removed from Canada Geese. Data concerning the bands:

- (1) An adult (sex uncertain) banded 508-23672 by the Colorado Game and Fish Department at Springfield, Colorado, on February 14, 1953, was shot by David Koomyuk near Wellington Bay during August of 1959.
- (2) An individual (age and sex uncertain) banded 587-21932 by C. L. Boynton at Santa Rosa Lake, Vernon, Texas, on February 26, 1959, was shot by John Kakagon near Cambridge Bay about July 21, 1960.
- (3) An adult (sex uncertain) banded 508-23043 by the Colorado Game and Fish Department at Springfield, on February 1, 1953, was shot by Luke Noliayok at Perry River, presumably the settlement near the Mainland, in "spring" of 1961.

These returns indicate that Victoria Island birds migrate through the interior and winter as far south as Texas. They also suggest a possible relationship with respect to migration between Victoria Island and Perry River birds.

Mortality

The fresh remains of an adult Canada Goose below an active Snowy Owl perch on Jenny Lind Island (June 27, 1962) were the only evidence of avian predation noted. A favourite of the Eskimo, these geese were hunted relentlessly throughout the summer period, chiefly near the main settlements and outlying camps. Numerous pairs were broken up, even at nests, and this must have accounted in part for the many single birds seen flying erratically.

Specimens

Three adult male Canada Geese were collected: one in 1960 at Cambridge Bay on August 13; two in 1962 respectively in the Augustus Hills on June 2 and on Jenny Lind Island on June 23. Weights (gm) and measurements (mm) of the June specimens: weight 2,268 to 2,494, flattened wing 410 to 415, tail 123 to 135, exposed culmen 35.0 to 38.0, tarsus 71.0 to 75.5. The August 13 specimen (weight 2,850, exposed culmen 36.5, tarsus 76.0) was in heavy moult; each wing contained nine new primaries, some sheathed at base, and all new secondaries; all its rectrices had been replaced, but only four were full length. This bird was flying when shot.

Two adult females (weight of one 2,300, flattened wing 380 to 399, tail 117 to 118, exposed culmen 35.0 to 35.5, tarsus 69.5 to 70.5) were collected at Cambridge Bay in 1960 on June 1 and 17, respectively. The June 17 specimen, not nesting when shot, had five new rectrices.

One nearly fledged female juvenile (weight 1,800, flattened wing 300) was collected at Anderson Bay on August 20, 1960.

One set of five eggs with down was collected at Cambridge Bay on June 18, 1962.

The above specimens compare favourably with a series of *Branta canadensis hutchinsii* in the National Museum of Canada. Although slightly larger than birds from the Hudson Bay region, they are much smaller, especially in bill size, than the race *parvipes*. The Cambridge Bay and Jenny Lind Island specimens also compare favourably with an adult female (flattened wing 402, exposed culmen 36.5, tarsus 71.5) collected at Walker Bay in northwestern Victoria Island on July 16, 1917 (No. 12951 in the National Museum of Canada).

Annual Breeding Cycle

Canada Geese return to southeastern Victoria Island as early as May 22, but the majority probably arrive there a week to 10 days later. Flocks of a few to upwards of 50 birds, some containing a few White-fronted Geese, rest at the early thawing coastal slopes southwest of Cambridge Bay, and likely elsewhere along the coast, before flying inland. Pairs go inland during the first week of June and some settle down quickly on territory. Egg-laying starts by June 9, probably earlier, and continues into mid-June. The nesting place is beside fresh water, usually a shallow pond, less often a larger body of water. The nest is a lined scrape on an islet, sometimes on a peninsula or bank of a pond or lake. The clutch is usually five or six eggs, sometimes three or four eggs. Hatching commences in early July and probably culminates in mid-July. Solitary pairs with young occur as late as August 3. They remain inland or near the coast, not necessarily near the nesting places. Little is known of the moulting and migratory movements of the non-breeding population. Adult birds with new remiges and rectrices fly as early as August 13. Flocks containing young of the year are conspicuous near the coast in late August and early September, the southward flights probably commencing at that time. The latest known date for the species at Cambridge Bay is September 9.

***Branta bernicla* (Linnaeus) Brant**

Brant are widely but thinly distributed in southeastern Victoria Island where scattered pairs and small colonies breed from near the coast to at least 60 miles inland. All Brant observed throughout this region were dark-breasted and are referred to the Pacific race *Branta bernicla nigricans*.

Although not conspicuous, the Brant was the commonest goose in the general vicinity of Cambridge Bay and in most places visited in 1960. That year Barry estimated 3,000 adults and young birds for the area covered by the waterfowl survey of August 7-9. The largest concentrations noted were at Wellington Bay (401 birds) and Albert Edward Bay (292 birds). According to Barry, the species could be found all the way to the north coast where, at Hadley Bay, he noted eight birds (*nigricans*) on August 9.

In 1962, Brant were less abundant at Cambridge Bay than in 1960, and it appears that their numbers may fluctuate there from year to year. We had

hoped to find both the Pacific race and Atlantic race (*Branta bernicla hrota*) on Jenny Lind Island in 1962, since the two races have been observed south of there in Queen Maud Gulf by Gavin (1947) and Scott (1951). But the only Brant seen there was a lone individual (race uncertain) flying along a coastal shore lead on June 25 (*see* Supplement, p. 217).

Previous Records

Smith and Sutton (1953) reported small numbers of Brant on the rivers draining to the south coast from Cambridge Bay westward to nearly the longitude of the Richardson Islands.

Arrival

Brant were first noted in 1960 on June 8 (five birds). From a flock of three near Mount Pelly that day, a male (largest testis 19.0 x 12.0 mm) and female (hard-shelled egg in oviduct) were collected, clearly indicating that egg-laying was under way and strongly suggesting that pairing and perhaps even copulation had taken place before arrival at the breeding ground—a phenomenon noted by Barry (1962) on Southampton Island.

In 1962, we especially looked for the species near Cambridge Bay and along the outer coast west of there during June 2–3 but failed to find it inland, at the coast, or flying at sea far from land. The first birds seen were near the head of Cambridge Bay on June 8. There were 11 of them flying together northwestward; later two, possibly a pair, left the flock and flew eastward. Flocks of migrating Brant were seen as late as June 13, but not thereafter. Apparently the species arrives at Banks Island in early June, the earliest date recorded by Manning, *et al.* (1956) being June 2.

Nesting

Isolated pairs of Brant nested almost exclusively at shallow, often marshy ponds, making their scrapes in the turf of small islands near the shore. The nest site was seemingly identical to that of the Canada Goose, although the two species did not occupy the same pond. One atypical Brant nest was on ground some 40 paces from water and only 33 paces from the nest of a Pomarine Jaeger.

Small colonies of a few pairs preferred the outer islands of lakes. The largest colony noted contained six nests spread over a chain of three small islands, also occupied by nesting Sabine's Gulls and Arctic Terns. The Brant also shared the nesting islands with Yellow-billed and Arctic loons, Oldsquaws, and Glaucous Gulls.

Although egg-laying started as early as June 9 in 1960, it did not culminate until mid-June, despite the fact that the thaw was early. Egg-laying started at one nest on June 18; at another containing three eggs on July 10 it may have been even later. On Banks Island, it may be as late as July 6 or later (*ibid.*).

The apparent clutch size at twelve nests was three eggs (one nest), four (six nests), five (four nests), six (one nest). The clutch of three was of a late nesting; that of another late nesting was thought to be three also. Barry

(*ibid.*) found that "the later the date of the first egg the smaller the clutch" for Brant breeding on Southampton Island.

The first egg at two nests was simply deposited in a bare scrape; on the other hand, a nest with two fresh eggs contained considerable down. The females incubated with neck and head pressed flat on the turf and were most reluctant to flush when approached, even more so than the Canada Goose. Once flushed, they remained close by with the mate, seldom flying out of sight.

A nest with four eggs on June 12 had five eggs on the 13th; young hatched from all five eggs during July 5-6. The period of incubation for the last egg was not less than 22 days, nor did it exceed 24 days. When first seen, all five young were being brooded in the nest. They immediately followed the female into the water, and the male soon joined them. The group then swam far out from shore. The following day the birds could not be found anywhere within a mile of the nest and presumably had abandoned the area.

Small downy young were next seen in a marshy area below Mount Pelly on July 9. Three of the young hid beneath low spreading willows while the fourth ran behind the parents. This family, also, could not be found on days following.

A nest with two fresh eggs on June 17 held but one and some empty shells 23 days later on July 10. The remaining egg had a live gosling within and was still being incubated by an adult which flushed from the nest. So far as is known, two young had already left the nest and no doubt were with the other parent, likely the male; these birds, however, could not be found despite our searching. According to Barry (*ibid.*), the gander is most solicitous in caring for young.

The largest concentration of breeding pairs noted in the Cambridge Bay area occupied a marsh area about two square miles in extent between Mount Pelly and Greiner Lake. In addition to the small colony referred to above, perhaps two dozen pairs nested within this area, and this represented as dense a population of nesting Brant as seen by us. Other widely scattered pairs nested near Cambridge Bay. Following hatching, all these birds seemingly left the breeding places. Some families remained alone, but others gathered in flocks, some of which contained fifty or more birds. These flocks were easily detected from the air and were noted from the coastal beaches to points far inland. Presumably some of them contained non-breeding birds in early moult, but others contained adults with young. According to Barry (*ibid.*), the moult in breeding individuals starts ten days following the hatch in *hrota*.

A flock of eight Brant noted near the beach of Anderson Bay on August 21 in 1960 contained six large but flightless young, and two adults that could fly. Another flock of three adults and five young, all of which could fly, were noted within three miles of Cambridge Bay on August 24 that year.

Departure

Our latest date for Brant was August 28 (1960). That day a flying flock of eight was noted near the south coast between Wellington and Cambridge bays. On Banks Island, the species was last noted on August 31 and August 28 in 1952 and 1953 respectively (*ibid.*).

Mortality

In 1960, a scrape with a single egg on June 11 held one egg that was punctured and drained on June 13. A nest with six eggs found by Waters on July 2 was deserted; one adult bird lay dead close by. Another nest with three whole eggs and a broken egg was deserted when found July 3.

On June 14, the gander of a solitary pair rose vertically from the water near its nest and nearly struck a Glaucous Gull that flew by some 200 feet above the nest. The gull flew on, and the gander did not pursue it further.

Brant and Glaucous Gulls nested side by side on an island in one of the deeper lakes southeast of Mount Pelly. Nestings of this sort were also noted on Banks Island by Manning, *et al.* (*ibid.*).

Eskimos hunted Brant throughout the summer and did not hesitate to shoot the goose on its eggs; since the gander was often close by, it was easily shot also.

Specimens

One adult male (weight 1,400 gm, flattened wing 336 mm, tail 97.5, exposed culmen 36.0, tarsus 61.5) was collected near Cambridge Bay on June 8, 1960.

Three adult females were collected: two (weight 1,280 to 1,475, flattened wing 318 to 327, tail 93.0 to 94.5, exposed culmen 31.5 to 32.5, tarsus 60.0 to 61.0) at Cambridge Bay respectively on June 8, 1960 and June 12, 1962; one (weight 1,600, flattened wing 311, tail 95.5, exposed culmen 30.0, tarsus 62.0) at Anderson Bay on August 21, 1960. The August specimen was flying when shot. It was in heavy moult; its remiges were new but sheathed at the base; its rectrices and tail coverts were old; its body feathers, especially of the back and pectoral areas, were being replaced.

One large but flightless male juvenile (weight 1,200, flattened wing 261) was collected at Anderson Bay on August 21, 1960.

Two downy sibling males (weight 45.0 to 47.0, exposed culmen 11.0 to 11.5, tarsus 26.0 to 26.5) were taken from the nest at Cambridge Bay in 1960 on July 6 and preserved on July 7. Both show the characteristic dark colour of *nigricans*, the down being especially dark around the eyes and on the forehead and crown.

According to Manning, *et al.* (*ibid.*), the belly and lower breast of four 24-hour-old siblings from Banks Island are smoke grey, being separated from the slightly darker upper breast by a white band; one male of the four lacks a white patch below the mandible on the throat that is present in the other three of unknown sex. One of the Cambridge Bay males clearly shows the white breast band and throat patch, but the other male lacks both of these white areas.

One set of four eggs with down was collected at Cambridge Bay on June 23, 1960.

Annual Breeding Cycle

Brant return to southeastern Victoria Island in early June. Solitary pairs scatter inland and select islets near the shores of ponds for nest sites. Several pairs may form small colonies at lakes, nesting on larger islands often in company with other bird species. Some pairs probably engage in copulatory

activities before arrival at the breeding places by June 8. Some females lay eggs immediately, but egg-laying on a population basis probably does not culminate until mid-June. Nothing is known of the breeding behaviour during years of late thaw. First eggs are laid in bare scrapes to which soon is added dark down. The clutch size is three to six eggs (average of 12 clutches: 4.41). The female incubates closely and is easy prey for the Eskimo hunter. The period of incubation is 22–24 days. Young start to hatch in early July, the male parent taking an active part in their care. Late-hatching eggs of a clutch are not necessarily abandoned; they may be incubated by a parent after the first young of the clutch leave the nest. Families abandon the nesting ponds for other areas inland or near the coast. They may remain alone or flock with others of their kind. Breeding adults fly as early as August 21. Flightless young occur as late as August 21, flying young as early as August 24. The species remains in the region until August 28, probably longer.

Anser albifrons (Scopoli) White-fronted Goose

Small numbers of White-fronted Geese are widely but not evenly distributed in southeastern Victoria Island. These birds appear to be locally abundant in some areas during nesting but are rare or absent elsewhere. The race occupying this region is here referred to as *Anser albifrons frontalis*.

During the waterfowl survey on August 7–8, 1960, the species was noted north of the Augustus Hills near Kitiga Lake (flock of 47 adults and young). Smaller flocks of adults and young were noted near Anderson Bay (15 birds) and in far eastern Victoria Island near Stromness Bay (36 birds) and Albert Edward Bay (28 birds). In the Cambridge Bay area in 1960, and probably in 1962, a few pairs nested in the vicinity of Greiner Lake and Mount Pelly. None was observed on Jenny Lind Island in 1962 (see Supplement, p. 218).

Previous Records

In 1953 Smith and Sutton (1953) noted 'small numbers' of these geese on the rivers that drain to the south coast from Cambridge Bay west to about the longitude of the Richardson Islands. In 1955 Fraser (1957) noted the species several times: two and three birds near Mount Pelly on May 28; a pair near Anderson Bay on June 3; a pair near Greiner Lake on July 2.

Arrival

A pair of White-fronted Geese flew near the settlement of Cambridge Bay the day of our arrival on May 31 in 1960. The following day we collected a lone female that flew over snow-covered terrain four miles north of the bay. Three separate pairs fed at spots where the turf was exposed half-way between Cambridge Bay and Mount Pelly on June 8. White-fronted Geese were not seen again that year until nesting was under way.

In 1962, an Eskimo reportedly shot a White-fronted Goose near Wellington Bay on May 22, but we did not see the species at Cambridge Bay until

the 24th (one flying near the bay). On May 30 one flew with a Canada Goose near Cambridge Bay, and a lone individual flying southwest of there was noted June 2. At the Augustus Hills, during June 2-3, a flock of 10 White-fronted Geese flying with Canada Geese was seen in addition to a few scattered individuals. One male (largest testis 21.0 x 13.0 mm) was shot by our Eskimo guide on June 2. The species was seen one more time in June (pair near Mount Pelly on the 17th), and for the last time that year on July 8 (one flying with Canada Goose near Mount Pelly).

Nesting

The only nest recorded was found by Waters on June 23 in 1960. It was situated in peat on a peninsula in a fairly large lake six miles or so west of Cambridge Bay. The five 'fresh' eggs were collected by Waters who thought that another pair nested in the same area, but that nest was not found.

Specimens

One adult male (weight 2,608 gm, total length 697 mm, wingspread 1,416, flattened wing 402, tail 115, exposed culmen 52.0, tarsus 73.0) was collected in the Augustus Hills on June 2, 1962. Colours of soft parts were: eyes dark brown, eyelids pale orange-flesh, bill dull flesh, legs and feet dull orange-yellow.

One adult female (weight 2,350, flattened wing 398, tail 118, exposed culmen 49.0, tarsus 69.0) was collected at Cambridge Bay on June 1, 1960.

Except for the eyelids of the male, there is little to suggest that these Victoria Island specimens are Tule Geese (*Anser albifrons gambelli*). They are distinctly smaller than known specimens of *gambelli* in the National Museum of Canada. Until more specimens are available for study, we assign these two Victoria Island birds to the race *frontalis*.

Victoria Island, heretofore virtually unknown with respect to this species, was thought by some investigators to be the likely breeding grounds of typical *gambelli*. Since this does not appear to be the case, the summer range of *gambelli* is further restricted. Tule Geese may yet turn out to be nothing more than individual variants of *frontalis*.

Annual Breeding Cycle

Small numbers of White-fronted Geese return to southeastern Victoria Island in late May, the earliest date recorded being May 22. The newly arrived birds, some of them paired, are commonly seen with flying and resting Canada Geese. One nest, on a point of land in a lake six miles from Cambridge Bay, contained five fresh eggs on June 23. Adults with young gather in flocks near the coast and inland; such flocks occur in widely separated areas in southeastern Victoria Island during August. Virtually nothing is known of the fledging period, moult, and departure from the region.

Chen caerulescens (Linnaeus) Snow Goose

The Snow Goose, here considered a polymorphic bird having white and blue colour phases, breeds sparingly near the coast in southeastern Victoria Island from just east of Anderson Bay to northern Collinson Peninsula, but apparently not beyond 69°55' N. As a result of the waterfowl survey of August 7-9, 1960, Barry estimated that there were 1,500 Snow Geese in this area. The birds were in widely scattered flocks containing adults and young of the year. The greatest concentration noted was at Albert Edward Bay (313 birds). Two colour phases were present almost everywhere the species was seen, the blue phase constituting about 20 per cent of the population.

At Cambridge Bay and points west of there migrating Snow Geese were noted occasionally in the spring of 1962.

Snow Geese were conspicuous, but not truly abundant, on Jenny Lind Island where solitary pairs and small colonies bred (*see* Supplement, p. 218).

The authors follow Cooch (1961) in considering the white-phased birds (Lesser Snow Geese) and the blue-phased birds (Blue Geese) conspecific, both phases belonging to the subspecies *Chen caerulescens caerulescens*. It is still a moot question whether the two phases actually represent a single subspecies, since behavioural differences exist between them (*see* Manning and Macpherson, 1961).

Previous Records

Simpson (1843) visited the south coast of Victoria Island in late summer of 1839 and reported that "on the borders of lakes numerous snow-geese had bred." He failed to elaborate further, and it is assumed that the geese had nested somewhere near the coast between Anderson Bay (Back Point) and Point Perry (west of Byron Bay), the only part of "Victoria Land" known at the time.¹ If this is true, the geese bred in a region where the species has not since nested, so far as is known.

Arrival

A flying flock of four large white birds with black wing tips seen near Cambridge Bay on May 26, 1962, almost certainly were Snow Geese. That year we noted a flying flock of five white- and one blue-phased geese over the Augustus Hills on June 3, and personnel of the Fisheries Research Board of Canada reported seeing "several pairs of Snow Geese" in the region between Mount Pelly and Mount Lady Pelly during June 6-7. Otherwise, none was seen at Cambridge Bay or anywhere west of there. Our observations substantiate those of the Cambridge Bay Eskimos who consider the Snow Goose an uncommon transient in the region.

Nesting

It was ascertained that about 70 Snow Geese inhabited the eastern third of Jenny Lind Island in 1962. Since they were more or less scattered, it is assumed that some pairs occupied the remainder of the island. Conceivably,

¹Simpson believed that 'Victoria Land' and 'Wollaston Land' were distinct land masses separated by marine waters.

the total population for Jenny Lind Island was three times 70, or 210 birds more or less.

Of the 70 geese observed, 10 were blue-phased birds, including two mated pairs, five individuals mated with white-phased birds, and one seemingly unattached individual. The 60 white-phased birds included 17 mated pairs, five individuals mated with blue-phased birds, and perhaps as many as 21 unattached birds.

The nests of eight white-phased pairs, one blue-phased pair, and one mixed pair were noted. These were in a variety of places—among boulders just up from the beach, near the banks of shallow ponds, on perfectly dry ridges well back from water, and on deserted owl mounds. None was situated exactly like those of the Canada Goose, which usually nested in isolated pairs on small islands or at the very edge of shallow ponds. The two species nevertheless were compatible and in one case nested within 66 paces of each other.

The nests were scrapes in the turf lined with down and feathers mixed with all sorts of plant material. Fresh down was gradually added until a considerable amount had accumulated. A nest of a solitary pair was an old scrape lined afresh.

Egg-laying probably culminated in mid-June. A set of six eggs collected June 20 were comparatively fresh, i.e., embryos were not yet apparent. The clutches of seven white-phased pairs varied from three to six eggs (av. 4.2 eggs). Of four eggs noted on June 24 only one may not have been complete. The clutch at the nest of blue-phased birds was five, at the nest of a mixed pair, four. Females of both phases incubated with heads high, but occasionally they pressed their necks close to the ground to avoid detection. The attending ganders, often standing within a short distance of the nest, were most conspicuous. When approached, the incubating Snow Geese as a rule flushed considerably sooner than incubating Canada Geese. Disturbed Snow Geese in returning to the nest did so by flying in low, rather than by walking.

A small colony of several pairs nested atop one of the higher ridges a mile from the sea. Three nests were within 220 paces of each other, forming a triangle. One belonged to white-phased birds, one to blue-phased birds, and one to a mixed pair (male white, female blue). Within half a mile of the three nests and fairly close together were two more of white-phased birds. The nest of still another white-phased pair we failed to find. All five sites were identical. Each was in extra lush vegetation of an abandoned owl mound in an otherwise barren stony terrain. When flushed, the pairs formed a flying flock that circled and wheeled overhead. Eight white-phased birds flew together at one point.

Since we left Jenny Lind Island on July 5 before hatching commenced, sets from white-phased and blue-phased birds and the set from the mixed pair were collected. After placing the eggs in an incubator, we returned to Cambridge Bay where four goslings from white-phased birds hatched during July 13-14. The other sets failed to hatch, and the shells were preserved as specimens.

Mortality

The only sign of predation was noted on June 25 by Sutton who came upon two Parasitic Jaegers attempting to spoil the nest of an isolated pair of white-phased birds.

Probably few Snow Geese are shot on southeastern Victoria Island, or on Jenny Lind Island, since the breeding areas are mostly remote from the main Eskimo settlements and camps.

Specimens

One adult white-phased male Snow Goose (weight 2,947 gm, total length 719 mm, flattened wing 458, tail 141, exposed culmen 61.0, tarsus 87.0) was collected with its white-phased mate (weight 2,721, total length 678, flattened wing 420, tail 124, exposed culmen 60.0, tarsus 81.0) at the nest on Jenny Lind Island on June 20, 1962. The alulae of the female are white, but the right alula of the male is blue, indicating the presence of blue-phased genes (*see* Cooch, 1961).

One breeding adult blue-phased female (weight 2,041, flattened wing 414, tail 121, exposed culmen 53.5, tarsus 82.0) was collected on Jenny Lind Island on July 2, 1962.

Four sibling Jenny Lind Island downies from white-phased birds hatched in an incubator at Cambridge Bay (*see* above). Of these, two were males (weight 70.0 to 73.0, exposed culmen 18.5 to 19.5, tarsus 30.0 to 31.0) that were weighed and preserved when four days old. The remaining two females (weight 60.0 each, exposed culmen 16.5 each, tarsus 27.5 to 29.5) were one day and three days old respectively, when preserved. Colours of soft parts: bill dark grey to dark olive grey with brownish nail; legs and feet dark olive grey.

One clutch of six eggs [length 75.4 to 81.3 (av. 77.48), width 53.5 to 55.2 (54.26)] of white-phased birds, one clutch of five eggs [77.3 to 80.5 (79.12), width 53.3 to 54.2 (53.8)] of blue-phased birds, and one clutch of four eggs [length 79.5 to 84.9 (81.35), width 49.8 to 52.1 (51.35)] of a mixed pair were collected with down on Jenny Lind Island in 1962, on June 20, July 5, and July 5, respectively.

Annual Breeding Cycle

A few migrating Snow Geese are seen occasionally in the general vicinity of Cambridge Bay in late May and early June. Little is known of their arrival and nesting behaviour at the breeding places east of there on Victoria Island where widely scattered flocks of adults with young occur in August. About 20 per cent of the population is blue-phased. On Jenny Lind Island, where 14 to 19 per cent of the birds are blue-phased, a few pairs breed singly or in small colonies. The nesting habitat is highly diverse. Fresh eggs occur as late as June 20, by which time most clutches are probably complete. The clutch averages four to five eggs. The period of incubation is 23 to 24 days (*see* Supplement, p. 218). Hatching commences in early July and continues into mid-July. Nothing is known of the fledging, moulting, or fall migration for the region. The species' breeding habits indicate that the lesser Snow Goose and Blue Goose are conspecific.

Anas platyrhynchos Linnaeus Mallard

According to native report, Mallards occur occasionally in the Albert Edward Bay area of southeastern Victoria Island (Fraser, 1957). D.B.O. Savile (note on file in National Museum of Canada) saw a female Mallard at close range at Cambridge Bay on August 25, 1958.

Anas acuta Linnaeus Pintail

Pintails are uncommon but regular visitors in southeastern Victoria Island. They also occur on Jenny Lind Island where, on June 24, 1962, we noted a flock of four drakes and another flock of six, most or all of which were drakes. It seems likely that the species breeds at least sparingly in both regions, but the only evidence for this is the finding of paired birds on Victoria Island during June and early July and, much later, flying birds of the year (*see* Supplement, p. 218).

In 1960 we recorded the following Pintails between Cambridge Bay and Mount Pelly: single drake on June 14; single drake on June 18; one pair (observed by Waters) on July 2; a flock of 10 drakes on August 11; a flock of five drakes and another of three birds in female-like plumage and a single individual in female-like plumage on August 15; flock of 15 in female-like plumage on August 16; a flock of eight in female-like plumage on August 30. These birds were flying or swimming in fresh water when first seen; all were extremely wild and flew off strongly.

Also in 1960, we noted six birds (swimming) in female-like plumage while flying over Wellington Bay on August 8; on August 20 our Eskimo guide, David Koomyuk, collected an immature drake from the waters of Anderson Bay.

In 1962, between Cambridge Bay and Mount Pelly, we noted a drake following a female from lake to lake on June 12; a flock of three drakes and two females on June 15; a pair on June 18. Later, Sutton recorded flocks of 6, 16, 18, 12, 30, 3, 3, 9, and 5 birds, respectively, on August 21, 22, 23, 24, 25, 27, 29, September 8, 12. All of these many birds had female-like plumage and short tails; all flew strongly. One collected August 29 proved to be an immature female.

Specimens

A fledged male juvenile (weight 810 gm, flattened wing 258 mm) was collected in Anderson Bay on August 20, 1960. Its plumage resembles that of a female; its testes measured: left 9.0 x 1.5, right 8.0 x 1.5.

A fledged female juvenile (weight 710, flattened wing 238) was collected at Cambridge Bay on August 29, 1962.

Anas carolinensis Gmelin Green-winged Teal

Apparently the Green-winged Teal is a rare visitor to the Arctic Islands. Waters (1961) saw one drake Green-winged Teal in a lake area near Mount Pelly on June 28, 1960. Since Hanson, *et al.* (1956) noted the species near Perry River on the mainland, we especially looked for it on Jenny Lind Island to the north but failed to find it there or anywhere in southeastern Victoria Island in 1962 (*see* Supplement, p. 218).

Aythya sp. Scaup

Two Scaup, presumably *Aythya marila*, seen from the air 10 miles northwest of Wellington Bay on August 8, 1960, were the only ones recorded in southeastern Victoria Island.

Clangula hyemalis (Linnaeus) Oldsquaw

Not nearly so common as the King Eider, the Oldsquaw is the second most abundant anseriform species on southeastern Victoria Island where scattered pairs and small colonies breed. During the waterfowl survey of 1960, on August 7-8, adult and young birds were most commonly observed along the coast of Queen Maud Gulf (330 birds) and in the Albert Edward Bay area (457 birds). They were fairly common at Hadley Bay on the north coast where Barry noted about 400 on August 9.

Oldsquaws bred sparingly on Jenny Lind Island where they were much less common than the King Eider in 1962 (*see* Supplement, p. 218).

Previous Records

Simpson (1843) presumably had Oldsquaws in mind when he stated that some "pintailed" ducks were among the myriads of large brown sea ducks that were congregated along the coast of "Victoria Land" during early September of 1839. Burwash (1931) mentioned seeing the species at sea along the south coast during September of 1928. Porsild (1951a: 40-2) considered Oldsquaws "quite common" at lakes north and west of Cambridge Bay. Tahoe and Washburn lakes, and others near the Richardson Islands, were among those visited during early August of 1949. Ellis (1956) noted three adults with 10 young and one adult with four young on lakes near Cambridge Bay in 1954, respectively on August 8 and 14. Fraser (1957) considered this species "more numerous" than any other duck and believed that it occurred throughout southeastern Victoria Island. In 1955 he observed a small flock at Anderson Bay on June 3, a small flock at Long Point on June 11, pairs along the south shore of Ferguson Lake on June 16, pairs on small lakes near Mount Pelly on June 17, pairs on Greiner Lake on July 2, and large flocks at sea off De Haven Point (east coast) on August 10.

Arrival

Two widely separated pairs on partly thawed lakes near Cambridge Bay on June 5 were the first Oldsquaws noted in 1960. The first ones seen in 1962 were two drakes flying together over sea ice near Long Point on June 4. Pairs were not observed inland until June 8.¹ In both years the species did not arrive in force before June 12. Although these birds were conspicuous, it soon became apparent that they were only locally abundant. Many ponds and lakes had few or no Oldsquaws, even during the height of arrival and nesting. Almost everywhere there were ten times as many King Eiders as Oldsquaws—a view also held by Waters.

¹At the floe off the coast of Sachs Harbour, Banks Island, Oldsquaws may be seen as early as mid-April, but apparently the birds do not go inland until early June (Manning, *et al.*, 1956).

Nesting

The only active nest recorded in 1960 was found by Waters between Cambridge Bay and Mount Pelly. Situated between dry hummocks within 25 feet of a lake, it held six eggs on June 18 and nine eggs on June 28. Laying at this nest probably had started no later than June 12. The remains of an old nest with faded down were also found that year. The nest was a few feet from water on a broad peninsula of hummocky ground that extended far out from shore in a rather small lake.

In 1962, at a lake near Mount Pelly, Sutton and Stephens found two nests with eight and nine eggs respectively on July 18. The nests were within a few yards of each other on an island that was also occupied by nesting Sabine's Gulls and a pair of Yellow-billed Loons. According to Cambridge Bay Eskimos, nests of Oldsquaws are found most often on such islands. These ducks also nest on sea islands in Queen Maud Gulf near the Perry River (Scott, 1951).

Earlier that year, on Jenny Lind Island, a nest with six eggs was found July 2 on a stony terrace about a half mile from the sea. The six eggs (small embryos) were collected on July 5.

Oldsquaw ducklings were first observed in the Cambridge Bay area in 1960 on July 18, and in 1962 on July 16. Most broods seen were solitary. Some joined forces and formed nurseries. These were not large, containing less than 20 birds usually, including one or two adult females in attendance. One flock observed by Sutton on August 21, 1962, was atypical in that it contained 138 flightless young and no adults. Time and again it was noted that the young of Oldsquaws and King Eiders did not fraternize. They invariably remained apart on the same waters.

Adult females and young Oldsquaws gradually made their way to sea where they were inconspicuous among the great rafts of eiders. There a number of them perished with eiders and loons in Eskimo fish nets.

Departure

The first sign of departure occurred in late June when flocking of drakes took place. These flocks were noticeable in shore leads along the coast where the species fed. Some males were still in full breeding feather. Others were dull and lacked long tail feathers. These flocks usually numbered 20 birds or less. The largest one seen at any time contained 24 flying drakes (Cambridge Bay, July 7, 1962).

No dramatic exodus of drakes was observed. Drakes were still common in the fresh waters in early July. They were last noted inland near Cambridge Bay in 1960 on July 10 (one bird); in 1962 as late as July 18 (three drakes with a female).

Certain females were prematurely unemployed and flocked early, probably as a result of having lost eggs or young. Such flocks were evident in late July and throughout August. The largest flocks seen contained 10 and 12 females, all flying, respectively on July 26 and 29 in 1962.

Oldsquaws were seen inland near Cambridge Bay in 1962 as late as August 25 (adult female with five flightless young). Females and young

(single birds and small flocks) were at sea along the outer coast between Wellington and Cambridge bays in 1960 on August 28. In 1962, they were last seen in the waters of Cambridge Bay on September 6 (flocks of 2 and 13 birds). Burwash (*ibid.*) reported that thousands of "eiders" and Oldsquaws were flocked along the south coast of Victoria Island between Stromness and Cambridge bays during September 14-15 in 1928.

Specimens

Three adult males were collected: two at Cambridge Bay, one in 1960 on June 5, and one in 1962 on June 15; one on Jenny Lind Island on June 24, 1962. Weight (gm) and measurements (mm) of the three: weight 695 to 850 (av. 755), flattened wing 224 to 231 (227.33), tail 203 to 235 (216.66), exposed culmen 25.5 to 28.0 (26.66), tarsus 35.0 to 36.0 (35.33).

Three adult females were collected: two at Cambridge Bay in 1960 on June 17 and July 18, respectively; one on Jenny Lind Island on July 5, 1962. Weight of one was 580; measurements of the three: flattened wing 200 to 208 (207.33), tail 55.0 to 61.0 (58.16), exposed culmen 24.0 to 28.0 (25.66), tarsus 34.0 to 34.5 (34.16). The bird collected July 18 was not moulting.

One large but flightless male juvenile (weight 640, flattened wing 144) was collected at Cambridge Bay on August 11, 1960. Its primaries were partly sheathed; down was conspicuous on upper back, rump, thighs, and pectoral areas.

One small downy female (weight 37.0, exposed culmen 11.5, tarsus 18.0) was collected at Cambridge Bay on July 18, 1960.

One set of six eggs with down was collected July 5, 1962, on Jenny Lind Island.

Annual Breeding Cycle

Moderate numbers of Oldsquaws return to southeastern Victoria Island and adjacent small islands in early June when pairs go inland and occupy partly thawed fresh waters. Most Oldsquaws arrive in mid-June when egg-laying gets underway. The nesting habitat is varied, but most nests are probably on islands in lakes, some islands having several nests. The clutch is six to nine eggs. Egg-laying continues into early July when drakes are still plentiful. It may continue even into mid-July when the first young hatch and the last drakes leave. A few broods form nurseries, probably resulting in the displacement of some females which go about in flocks with other unemployed females. Flightless young occur inland as late as August 25, probably later. Many adult females and young go to the sea where they have been seen by some observers as late as September 15.

Somateria mollissima (Linnaeus) Common Eider

The Common Eider probably breeds on a number of small islands off the south coast of Victoria Island. Former observers noted it in Dolphin and Union Strait and Coronation Gulf. In 1960, we noted it with certainty only on the Finlayson Islands in Dease Strait where it breeds; in 1962, we found it breeding on Jenny Lind Island in Queen Maud Gulf.

Finlayson Island and Jenny Lind Island birds belong to the race *Somateria mollissima* v. *nigra*, the Pacific race, the breeding range of which is not known to overlap that of other races, notably *Somateria mollissima borealis*, in Canada. Jenny Lind Island is as far east as the Pacific race is known to breed. This race, however, has been seen as far east as King William Island (Gavin, 1947; Fraser, 1957).

Previous Records

Anderson (1913) stated that this eider bred as far east in Canada as Simpson Bay, Victoria Island, where on June 26, 1911, he found a nest "containing eggs." In the National Museum of Canada there is a subadult female specimen (NMC No. 16272) that was collected by Captain Joseph Bernard on Taylor Island, off the east coast of Victoria Island, on January 9, 1918. In 1955 Fraser (*ibid.*) noted small groups of these eiders alighting in leads of Dease Strait between Long Point and Cape Enterprise on June 12 and "pairs" in Anderson Bay on August 5.

Arrival

The Common Eider may winter to some extent in open water near Victoria Island, for Bernard (*see above*) secured a female at Taylor Island as early as January 9. Statements in the literature, e.g., Bent (1925) and Kortright (1942), asserting that these birds do not winter north of Bering Straits for lack of open water may not be entirely accurate. But the majority of these eiders almost certainly move westward in fall along the arctic coast of Canada and Alaska where large numbers have been seen migrating.

In Alaska they first appear off Wales on their spring flight in late March, but apparently not in force until the first week in June (Bailey, 1948). Presumably most Dease Strait and Queen Maud Gulf birds arrive at the breeding grounds some time in mid-June. Pairs were already established on the Finlayson nesting islands when we first arrived there in 1960 on June 20. No eiders were seen flying over the sea ice or swimming in the leads between Cambridge Bay and the Finlayson Islands during June 3-4 in 1962. The species was first noted that year on June 18 when a single drake was flying inland several miles from Cambridge Bay. On June 21, when we first visited Jenny Lind Island, these eiders were already there at the breeding places.

Courtship

Although courtship may take place mainly outside the breeding areas (*see* Nelson, *in* Bent, 1925), we observed it near the Finlayson Islands as late as June 21. Two drakes swam side by side and displayed before a single female in a pool on sea ice near the beach. Swimming forward with bills held low, they suddenly snapped their heads backwards and uttered the peculiar *ah-oo* cries characteristic of *S. mollissima*. One individual performed this way three times in quick succession.

Nesting

In open leads and pools near the outer island of the Finlayson group, about 25 Common Eiders were noted during June 20–22 in 1960. Most of these birds were paired, or there were several drakes with a duck. The largest flock seen numbered five birds. Old nest scrapes were found scattered at various levels in moss or turf among the rocks, some more than a hundred feet above the sea. On June 21 a pair flushed near a fresh scrape (no eggs) several hundred feet back from the beach on fairly low ground. Later that day our Eskimo guide, Luke Kodlak, shot a pair (male: left testis 35.0 x 15.0 mm; female: enlarged ova 43.0 mm and 27.0), also clearly indicating that egg-laying was about to commence.

According to Kodlak, the sea eiders bred in far greater numbers on the smaller outermost islands of low relief where the natives occasionally gathered eggs but apparently not the down. We did not visit these particular islands, however.

On Jenny Lind Island, in 1962, about 40 birds inhabited a two-mile-long stretch of the northeast coast. Here, in late June, they could be found in pairs or small flocks resting on the sea ice, separated from the shore by a lead several hundred feet wide in places. Reluctant to leave this particular shore, the eiders flew back and forth along the lead even when flushed repeatedly. Specimens disclosed that both breeding and non-breeding individuals of both sexes were present. The drakes at this time did a little cooing but not much. All of these eiders kept to themselves, not mixing freely with King Eiders and Oldsquaws which also frequented the lead. Elsewhere on Jenny Lind Island the species was noted but once: a pair on a grassy islet of a large lake several miles from the coast on June 25. We did not visit the south and west coasts of the island where other pairs may have resided.

The one nest found (by Sutton) was in a pile of dry kelp just back from the stony beach in the area described above. It held four eggs and much down on June 28, five eggs (full clutch) on the 29th. The duck upon flushing usually defecated on the nest. When last visited during high tide on July 1 the eggs were only 15 feet from sea-water (*see* Supplement, p. 219).

Departure

This eider was not recorded by us after June 22 in 1960; but according to Anderson (*ibid.*), the males migrate in flocks westward along the arctic coast of Canada shortly after egg-laying, the largest numbers after July 18. Females and young of the year migrate later, some remaining until "late in October." In 1962, Sutton noted one female at a pond about two miles inland from Cambridge Bay on July 13 and one female by the beach near Long Point on August 16—our latest date for the species.

The principal wintering areas of the Pacific race appear to be the Aleutian Islands and the Alaska Peninsula. If the Finlayson and Jenny Lind birds go there, their migration flight must be one of the longest for the species.

Flight Pattern

An odd flight of this eider was noted June 22 in 1960. Flying in from the sea, a number of these birds passed every so often just above a rocky slope near camp on the Finlayson Islands where Schmidt was preparing specimens. Several times he had to dodge quickly to avoid one coming in low and fast. Most interesting was the fact that some of these flying eiders glided on set wings for short distances, alternating the glide with the usual beat, a phenomenon not often reported. The birds were not attempting to alight.

Specimens

Two adult male Common Eiders were collected on the breeding grounds: one on the Finlayson Islands in 1960 on June 21, and one on Jenny Lind Island in 1962 on June 29. Weights (gm) and measurements (mm) of the two: weight 2,313 to 2,600, flattened wing 314 to 320, tail 100 to 117, exposed culmen (from mid-feather edge to tip) 45.5 to 54.0, tarsus 49.5 to 54.5.

Two adult females were collected on the breeding grounds: one on the Finlayson Islands in 1960 on June 21, and one on Jenny Lind Island in 1962 on June 29. Weights and measurements of the two: weight 1,927 to 2,950, flattened wing 299 to 307, tail 94.0 to 96.0, exposed culmen 43.5 to 47.5, tarsus 48.0 to 51.5.

One subadult male (testes small, weight 2,041, length from bill tip to tail tip 622, flattened wing 310, tail 94.0, exposed culmen 48.5, tarsus 55.5) was collected on the breeding grounds of Jenny Lind Island on June 29, 1962. Its wing coverts were brownish, its white inner secondaries and tertials edged with brownish. According to Kortright (1942), a bird of this sort would be in second autumn plumage.

One subadult female (weight 2,086, flattened wing 300, tail 89.0, exposed culmen 53.5, tarsus 52.5) was collected on the breeding grounds of Jenny Lind Island on June 29, 1962. Colour of soft parts: bill, dark olive grey (nail, pale olive grey); legs and feet, dull brown.

One set of five eggs with down was collected on Jenny Lind Island on July 1, 1962.

Annual Breeding Cycle

Common Eiders arrive in the Dease Strait and Queen Maud Gulf breeding areas in early June. The birds occupy the sea ice near leads, sometimes flying inland where they are seen occasionally resting on the shores of fresh waters. Courtship, though noted but once, occurs as late as June 22. The breeding places are close to the sea on small islands of varying relief or the rocky coasts of larger islands. These are inhabited by both breeding and non-breeding birds. The nest may be near the beach, or several hundred feet back on higher ground, or a mile or so inland. Egg-laying starts in late June and probably continues into July; but when it culminates is not known. Virtually nothing is known of the species in Dease Strait or Queen Maud Gulf following hatching. Winter birds, reported from the region by early observers, need further attention, but the majority of these eiders probably migrate to Pacific wintering grounds.

Somateria spectabilis (Linnaeus) King Eider

The King Eider is by far the most abundant anseriform species in southeastern Victoria Island where numerous pairs scatter widely over the tundra. Following nesting, great numbers of adult females and young of the year gradually make their way to the coastal waters where the birds form enormous rafts. King Eiders are then the commonest birds along the Victoria Island coast.

During the waterfowl survey flights of 1960, many adult females and young were noted August 7 from Cambridge Bay eastward to Victoria Strait and northward to Collinson Peninsula; on August 8, from Cambridge Bay westward to about $111^{\circ}31' W$, beyond the Richardson Islands. Common at the coast, they appeared to be equally numerous 60 miles inland. On August 9, Barry flew from Cambridge Bay to Hadley Bay and observed that their numbers dropped appreciably north of $70^{\circ}30' N$. At Hadley Bay their numbers increased again (1,130 birds recorded). Barry estimated 800,000 King Eiders for Victoria Island—a significantly greater number than estimated for Banks Island (see Manning, *et al.*, 1956).

On Jenny Lind Island the King Eider is a fairly common breeding species.

Previous Records

The "myriads of large brown sea-ducks" that were seen congregated along the Victoria Island coast from Cambridge Bay westward beyond Wellington Bay by Simpson (1843) in early September of 1839 likely were of this species. Collinson (1889) meant King Eiders when he stated that "ducks" were brought in by hunters in "considerable quantity" at Cambridge Bay in 1853 during June 12–19, and that "two eider ducks' nests with nine eggs" were found there on July 1. One egg (in British Museum) was collected at Cambridge Bay by members of H.M.S. *Enterprise* under Collinson (Oates, 1902). Ellis (1956) stated that King Eiders were "very abundant" at Cambridge Bay in 1954. Fraser (1957) believed that they occurred "throughout" the entire southeastern part of Victoria Island in 1955.

Arrival

According to Anderson (1937), King and Common eiders appear from the west over the ice near the Arctic Coast (Liverpool Bay) in May, flying in "flocks of varying size, the first flocks usually males, but later mixed." King Eiders were paired when first noted inland near Cambridge Bay in 1960. The first seen—a solitary pair on June 4—rested on a partly thawed pond near the West Arm. A flock of four flying, and a solitary pair in an open pond, were noted near the settlement on June 5 and 6, respectively. On June 7, we collected the drake (largest testis 29.0×12.0 mm) of a pair flying a mile inland. A number of pairs and several flocks were seen as far inland as Mount Pelly on June 8, and thereafter the species could be found almost everywhere on the fresh waters inland from Cambridge Bay.

The largest single flying flock seen (June 9) numbered 10 birds, all flying in single file; otherwise, the flying flocks were small, often only three or four birds of mixed sex. The lead bird of a pair in flight was usually, but not

invariably, the duck, followed closely by the drake. Resting flocks of a few to upwards of a dozen or more individuals were common. Many contained mated birds. Lone individuals were noted, but most King Eiders observed in early and mid-June were paired.

Pairs were also seen flying or swimming in open leads far out at sea between Cambridge Bay and the Finlayson Islands during June 20-22.

The 1962 arrival was similar to that of 1960. King Eiders were first seen on June 3 when a flock of 20 or more birds (sex uncertain) flew in single file low over the sea ice not far from the Finlayson Islands; later that day a flying flock of five drakes was seen farther out at sea.

The first pair seen was inland from Cambridge Bay on June 6. On June 7 an extra large flock of about 25 birds (sex uncertain) flew eastward along the bay. The species became more numerous each day until mid-June when it appeared to be common everywhere inland.

Courtship

On June 11, 1962, at a sheltered pond several miles inland from Cambridge Bay we observed three males perform unpretentiously before as many females. Cooing softly, the drakes at different times pointed their bills downward while puffing up their chests; they threw their heads suddenly backwards with bills straight up and chest feathers elevated. The females showed no great emotion, occasionally uttering low notes described by Sutton as *kuck* or *kwack*.

Nesting

Twenty-five active nests, including several found by Waters, were noted near Cambridge Bay in 1960, and another four were observed there in 1962. Seven additional nests were noted on Jenny Lind Island in 1962 (*see Supplement*, p. 219).

All these nests were fresh scrapes variously situated on dry, often rocky slopes, not necessarily well vegetated. None was at the very edge of water; nor were any found on islands where the species sometimes breeds colonially. Most were widely scattered on slopes well above a lake or pond, in one instance a quarter mile from water. The two closest nests seen were about 200 yards apart. The first eggs of a clutch were scantily covered with grass and moss and bits of other plants, until the down accumulated. The down is quite resistant to weathering, for a good many nests from former years were found by spotting the somewhat faded and scattered old down.

Egg-laying at Cambridge Bay started in mid-June, as early as June 12, for a female flushed from six eggs on the 18th. It appeared to culminate by June 20 or thereabout, falling off sharply by July. On Jenny Lind Island it may have been later. A nest with four eggs (incomplete clutch) on June 21 and another with six apparently fresh eggs on the 24th were the earliest signs of laying, which probably had started no later than June 18.

The drake evidently follows the duck right to the site, for we surprised several pairs at the nest. At one site, on June 25, 1960, a pair flushed from a fresh scrape, which was eggless at 2:30 P.M., but which held a fresh egg at 4:00 P.M. that same day.

The apparent clutch at twenty-seven Cambridge Bay and Jenny Lind Island nests was three eggs (one nest), four (seven nests), five (nine nests), and six (ten nests). Jenness (1959) stated that he and his Eskimo companions "invariably found four to seven eggs" in King Eider nests in western Victoria Island (Colville Hills north of Simpson Bay) in 1915.

King Eider ducks sit closely and are hardly discernible on the nest. Some will not flush even when touched. In three cases we picked the ducks off the eggs and banded them. They did not attempt to bolt when put back and stroked gently. Upon flushing the duck almost invariably defecates, soiling eggs and down. The excrement has an extremely foul odor and probably is protective. When not forced from the eggs, the duck covers them with down and goes to the lake or pond near by. She may remain there for a time drinking and exercising but apparently not eating (Freuchen and Salomonsen, 1958).

The period of incubation for the last egg (marked) of one five-egg clutch was not less than 22 days and not greater than 24 days. Another nest with six eggs on June 24 still held six eggs on July 15. Twenty-four hours later it held one newly hatched duckling (wet) and egg membranes. The period of incubation for this duckling was at least 22 days. All six eggs had hatched within a 24-hour period; the last one had been abandoned.

The abandonment of the last egg (live young within) by the female was also noted at another nest. Whether the duck follows the first young or deliberately leads them off is uncertain. On the other hand, one duck flushed from the one remaining egg of a five-egg clutch, and another flushed from the last two remaining eggs of a three-egg clutch. In both cases the first young had been hatched successfully (egg membranes present) but could not be found anywhere near the nest. Presumably they were lost to a predator, perhaps to another female eider.

Newly hatched young in 1960 were noted as early as July 14 and as late as July 25. Allowing 23 days for incubation, egg-laying at these nests must have been completed about June 21 and July 2 respectively.

Following hatching, an inconspicuous shuffling of females and their broods took place in the breeding areas. In painting the bills and upper wing coverts of two incubating ducks (also banded) for easy field identification, we had hoped to observe the birds later with their young. It was presumed that they would remain close by, possibly at the nearest water. This was not the case. Following the hatch the ducks and young immediately left for other parts and were not seen anywhere in the vicinity of the nests again that summer (one of the banded females was recovered a year later). Other ducks with broods moved in and occupied the waters abandoned by the original owners—a fact that would have escaped attention had the first birds not been marked. As the season advanced it became apparent that certain ponds containing ducks and broods one day were not always occupied the following day.

Broods of 13 ducklings reported for Cambridge Bay by Ellis (*ibid.*) represent several broods, not single ones. In 1960 and 1962, broods were common after July 18. These almost at once started to form the famous King Eider nurseries, consisting of two or more broods of a few to upwards of a hundred or more individuals, mixed indiscriminately. The adult females in attendance usually numbered two or three, the largest number recorded

being nine. Some females obviously lost their young to the larger flocks. Lone unemployed females and flocks of unemployed females increased daily and may account in part for the early females reportedly migrating along the Arctic Coast in July and August (*see* Anderson, *ibid.*).

The flightless young and attending females gradually made their way down to the coast, some by way of streams. The Eskimos shot them (specimens secured) at sea as early as July 30. We first noted them in the waters of Cambridge Bay on August 6. Soon the species became the most familiar bird of the outer coasts.

Numerous young of the year were noted between Cambridge and Anderson bays during August 20–21, 1960. All appeared to be flightless. When chased by boat, they attempted flight by flapping along the surface of the sea, finally diving. The attending females, however, flew off. Whether they had new quills was not determined. Young were flying strongly over the coastal waters between Cambridge and Wellington bays during August 27–28 that year.

Departure

In 1960 the first sign of a post-breeding migration of male King Eiders occurred June 28, when two flying flocks of seven drakes each were noted several miles inland from Cambridge Bay. Some drakes were still mated on June 30, but many were flocking then. In early July there was a mass exodus. Only a few drakes were noted inland during July 2–3, and none thereafter.

On Jenny Lind Island, in 1962, a change in bill colour of the drakes was first noted on June 27. The bills appeared much duller than earlier. Drakes were still common inland and in the coastal leads on the 28th, but then their numbers declined rapidly. A few drakes, including one with a duck, were seen on July 3, but not thereafter. None was seen at Cambridge Bay following our return there on July 5.

It is an interesting phenomenon that some Canadian drakes migrate far eastward following breeding to west-central Greenland to moult (Freuchen and Salomonsen, *ibid.*). Individuals banded in Greenland during moulting were recovered as far west as King William Island, and according to Freuchen and Salomonsen, some of these eiders possibly breed as far west as Bathurst Inlet.

Equally interesting is the fact that Anderson (*ibid.*) for many years observed great numbers of post-breeding King Eider drakes migrating along the Arctic Coast of Canada from east to west toward Alaska, where many eiders follow the coast. These birds, apparently from as far east as Coronation Gulf and Dolphin and Union Strait, were flying west by the end of June, their numbers increasing after the first of July. It appears that part of the Victoria Island birds migrate far east and part far west.¹

Except for a single individual noted August 21 in the wide open waters of Queen Maud Gulf, no drakes were seen at sea that month. The bird referred to above was in fairly bright feather and flew off strongly when

¹Thompson and Person (1963) estimate that during the autumn flight a million adult King and Common eiders migrate westward by the famous "Eider Pass" at Point Barrow, Alaska. This figure is too low to account for all the eiders breeding east of Point Barrow and suggests that a good many migrate to the east.

pursued. A crippled drake in heavy moult was collected inland near Cambridge Bay on August 15 (see Specimens below).

In 1960 perhaps a large majority of adult females and young of the year inhabited the coastal waters by late August, but a fair number were still inland on August 27. No large-scale migratory movements of these birds were noted up to August 30. Sutton and Stephens noted them inland as late as September 9 in 1962.

Anderson (*ibid.*) noted only an "occasional" adult female in the migrating flocks of drakes moving westward along the Arctic Coast of Canada before July 18. The numbers of females gradually increased from then on and were later augmented by the young. Apparently some young remain until late in the year if water is available. Anderson recorded them in November.

Banding

Two incubating King Eider ducks were banded (496-49101 and 597-24401) on the tundra between Cambridge Bay and Greiner Lake in 1960 respectively on July 11 and 14. Female 496-49101 was "Taken" in "June 1961" by Mr. Frank Analok at or near Greiner Lake, probably within five miles of the 1960 nest. Mr. J. E. Bryant, Superintendent of Game at Fort Smith, Franklin District, N.W.T., reported the recovery. Female ducks, not necessarily drakes, of other species return to the home breeding ground (Hochbaum, 1961).

Mortality

Large numbers of King Eiders were sought by the Eskimos, particularly in late summer when the sea abounded with young. Many King Eiders accidentally perished in fish nets that were set in the bays.

Predators no doubt included the jaegers which frequented the breeding areas in numbers. Two eider nests under observation in 1960 were likely destroyed by them. A nest with a single fresh egg one day held only a broken egg (contents eaten) several days later. Two eggs of a six-egg clutch were broken and the contents eaten, and, as a result, the nest was deserted.

Snowy Owls fed almost exclusively on lemmings in 1960, but at one owl nest the picked remains of an adult female King Eider was found July 28. When, on August 1, an owl from this same nest flew low across a pond, a King Eider duck and its brood quickly dove from sight.

Specimens

Five male King Eiders at least two years old were collected: four inland at Cambridge Bay in 1960, three during June 7-18 and one on August 15; one inland on Jenny Lind Island on June 26, 1962. Weights (gm) of three: 1,555 to 1,650 (av. 1,610.0); measurements (mm) of five: flattened wing 276 to 287 (281.6), tail 80.5 to 88.0 (83.5), exposed culmen 28.0 to 33.0 (30.1), tarsus 42.0 to 49.0 (46.8). The bird collected August 15 was a cripple (broken wing) that weighed only 1,250 grams when found. Otherwise, it appeared healthy. Although its remiges had not been replaced, it was in partial eclipse plumage (numerous pin feathers, especially on neck and

scapular regions) with incoming brown feathers on crown, cheeks, and throat; the knob or bill process was much reduced; the largest testis measured 9.0 x 4.5.

Two adult females (weight 1,200 to 1,400, flattened wing 269 to 276, tail 77.5 to 80.0, exposed culmen 33.0 to 34.5, tarsus 46.0 to 46.5) were collected at Cambridge Bay in 1960 respectively on July 30 (at sea) and August 19 (inland). Both were moulting slightly.

One large, well-feathered male juvenile (weight 1,395, flattened wing 245) was found dead at Cambridge Bay on September 2, 1962. One large, well-feathered female juvenile (weight 770, flattened wing 239) was found crippled at Cambridge Bay on August 28, 1962.

One large but very downy male juvenile (weight 550) was collected at Cambridge Bay (at sea) on July 30, 1960. Its short remiges (26.0 mm) and rectrices (22.0) were sheathed; incoming body feathers were conspicuous only on the upper back and side regions.

Two female downies (weight 88.0 to 89.0, exposed culmen 13.5 to 15.0, tarsus 24.0 to 28.0) were approximately four or five days old when collected inland at Cambridge Bay on July 19, 1960.

Three male downies (weight 35.0 to 45.0, exposed culmen 9.0 to 10.0, tarsus 20.5 to 21.0) were collected inland at Cambridge Bay in 1960 and preserved when less than 20 hours old during July 15-16. One female downy (weight 39.0, exposed culmen 10.0, tarsus 22.0) was collected inland at Cambridge Bay in 1960 and preserved when about 20 hours old on July 15. The males are slightly buffier than the female, noticeably about the eyes, cheeks, and chin.

One set of six eggs with down was collected at Cambridge Bay on June 25, 1960, and another of six eggs with down on Jenny Lind Island on June 26, 1962. The 12 eggs measure: length 61.7 to 67.0 (64.36), width 39.9 to 44.2 (43.16).

Annual Breeding Cycle

King Eiders return in early June to southeastern Victoria Island and adjacent small islands where they can be seen flying over the sea ice or resting in the partly thawed fresh waters. Many of them are paired when they move inland, and the pairs go about mostly in small flocks until nesting time. Some courtship takes place at this time, but it is not conspicuous. By mid-June many pairs have arrived at the breeding grounds, the favourite places being the drier, often barren slopes overlooking lakes and ponds. The pairs disperse widely, no two pairs nesting very close together as a rule. Egg-laying starts as early as June 12 and continues into late June; it virtually ceases by July when the drakes suddenly abandon the region. The clutch is three to six, perhaps seven eggs, averaging four to five eggs. The period of incubation is 23 to 24 days. Eggs hatch in mid-July and in late July. Late-hatching eggs of a clutch may be abandoned. Following hatching, the duck and brood may leave the nesting site and adjacent ponds, which in turn may be occupied by another duck and her young. Broods eventually come together and form nurseries. These often contain many young and relatively few attending adult females. Displaced adult females flock and migrate early. Females accompanied by young

gradually move from inland to coastal waters, some as early as July 30, others as late as September 9. Both adult females and young of the year are conspicuous in the wide open marine waters of the outer coasts where flightless juveniles occur as late as August 21 and flying juveniles as early as August 27. Although the last of the adult females and many juveniles probably leave the region in September, a few eiders likely remain until all waters freeze shut. Some Victoria Island King Eiders probably migrate east to Greenland, others west to Alaska. One banding return indicates that the adult female returns to the same nesting ground the following June.

Mergus serrator Linnaeus Red-breasted Merganser

The Red-breasted Merganser (*Mergus serrator serrator*) appears to be a rare breeder in southeastern Victoria Island. We noted it but twice in 1960, both times from the air in the extreme southeastern part of the island on August 7: two birds of uncertain sex far inland at about 69°5' N, 102°21' W; one bird of uncertain sex near the coast at about 69°13' N, 102°4' W. In 1962 we obtained a pair from an Eskimo hunter, who secured the birds at one of many lakes between the upper end of Cambridge Bay and Greiner Lake on June 7. The male (largest testis 27.0 x 15.0 mm) and female (largest ovum 10.0 mm) presumably were a mated pair. We did not observe the species anywhere on Jenny Lind Island.

Specimens

One adult male (weight 910 gm, flattened wing 237 mm, tail 79.0, exposed culmen 55.0, width of upper mandible at base 15.0, tarsus 43.5) and one adult female (weight 765, flattened wing 219, tail 73.5, exposed culmen 52.0, width of upper mandible at base 13.5, tarsus 40.0) were shot at Cambridge Bay on June 7, 1962.

Buteo lagopus (Pontoppidan) Rough-legged Hawk

Rough-legged Hawks breed in small numbers along the southeastern coast of Victoria Island where, with notable exceptions, nesting cliffs are scarce. Much of the inland terrain is rough but not precipitous. Even during good lemming years, the hawks are concentrated at choice coastal sites, the inland tundra having few pairs. Victoria Island birds are best referred to the race *Buteo lagopus s. johannis*.

In the peak lemming year of 1960, the species bred fairly abundantly near the coast from Anderson Bay to Cambridge Bay, and at least one pair nested on the Finlayson Islands. A few pairs also bred several miles inland from Cambridge and Wellington bays. Likely breeding places are the Richardson Islands and rocky coast of Victoria Island north of there, where two hawks were noted on August 8. In the poor lemming year of 1962, some pairs returned and defended their nests but did not breed. That year the species was not recorded on Jenny Lind Island where it probably breeds occasionally (see Supplement, p. 219).

Previous Records

Porsild (1951) found a nest with "downy" young near Washburn Lake as late as August 4, during the retarded season of 1949. Washburn Lake, one of the very large inland waters of Victoria Island, lies on the 70th parallel northwest of Cambridge Bay. Fraser (1957) considered the species scarce throughout southeastern Victoria Island and commented on the lack of nesting cliffs. On August 26, 1955, he found a nest with four "nearly full-grown" young atop a five-foot-high erratic lying on an otherwise fairly level plain, presumably near Ferguson Lake.

Arrival

Rough-legged Hawks were already established at Cambridge Bay when we arrived there on May 31 in 1960. Although we were ever watchful for these hawks following our arrival there on May 10 in 1962, we did not see the species until May 21—a single bird flying near the bay. In southern Banks Island the species was noted as early as May 14 and May 15, in 1952 and 1953 respectively (Manning, *et al.*, 1956).

On May 24, 1962, two pairs flew back and forth, occasionally circling, near the top of Mount Pelly, but they did not defend old nest-sites or any special areas that day. Except for numerous exposed ridge tops and rocky prominences, much of the terrain including Mount Pelly was covered with snow. The piebald hawks blended perfectly with the light and dark landscape and were invisible at times, suggesting that the species can be easily overlooked before the thaw.

Nesting

The rocky shore with precipitous cliffs, nearly a hundred feet high in places, at the head of Anderson Bay is ideal for nesting Rough-legged Hawks. At least four pairs bred there in 1960, nesting on ledges and pinnacles above the waters of the bay. These nests were difficult to reach and required some care in climbing to them. When first seen during August 20–21, the young hawks were large and in many cases had fledged. Some bolted from the nests or ledges near by as we approached. Inasmuch as most of these young scattered among the rocks or flew off strongly, we made no attempt to count them. Two young, perched atop a large erratic half a mile east of the cliffs, may have been from a nest overlooked.

A fifth nest was on a low but perpendicular outcrop of rock at the edge of a grassy meadow several hundred yards north of the bay. Young on the rocks near the empty nest were easily seen from afar. A sixth nest was on a sheer sea cliff midway between Anderson and Cambridge bays. Young from this nest, also, were scattered among the rocks and essentially fledged on August 21. None of these six sites was checked in 1962.

The gull island in the Finlayson group had an active hawk nest on a low cliff a hundred yards from the beach and a quarter mile from the gullery in 1960. From this nest we collected six eggs, some of which had fairly large embryos, estimated to have been at least 10 days old on June 21. We revisited this same cliff on June 3, 1962, finding it defended at the time by one hawk. The bird, crying loudly, wheeled high overhead, occasionally flying

far out over the sea ice and returning again. At that time snow completely covered the nest, and we failed to find another. No hawks or their cries were noted when Sutton and Stephens next visited the island on August 10. Most certainly the hawks did not breed there in 1962.

There are no sea cliffs at Wellington Bay, but the country inland from there has a good number of bluffs rising boldly from the grassy meadows, and there are also some real cliffs. Two nests used in 1960 were found on such prominences that year on August 26. The young had already left the nesting rocks and were flying about, as were the adults that attended them. One of the adults, a very dark individual, was the only melanistic Rough-legged Hawk seen anywhere on Victoria Island by us. Dark individuals are considered scarce in the Western Arctic.

Parts of the coast east of Wellington Bay, between Cape Enterprise and Starvation Cove, are well suited to the nesting requirements of the species, although no hawks were actually noted in the area when visited briefly on August 28, 1960. The Augustus Hills, midway between Wellington and Cambridge bays, are less suitable. The rounded hills are deeply dissected by streams in several places, but a search of the deep gully walls during June 2-3, 1962, disclosed not a single old nest; nor were any hawks seen or heard along these narrow hills that run parallel to the coast.

The terrain about Cambridge Bay is not well suited to nesting Rough-legged Hawks. It was soon apparent that the best sites were at a premium there in 1960, for three pairs occupied the highest ridge—Mount Pelly. A fourth pair nested on an unpretentious bluff a mile south of Mount Pelly and a fifth pair on the ground atop a perfectly flat ridge overlooking a narrow inlet of Cambridge Bay several miles north of Cape Colborne. The nest of a sixth pair was not found, but more than likely it was on one of the steep banks overlooking the West Arm of the bay.¹ Excepting these few birds, the vast tundra that extended for miles inland had none of these hawks, despite the fact that there was an abundance of lemmings.

The pair nesting on the flat ridge north of Cape Colborne was noted August 8, when there were four large but flightless young in the nest. A fifth young, badly decomposed, lay on the ground near by. On August 13, one of the four siblings bolted from the nest and flew 50 yards before falling, but it did not bolt a second time when returned to the nest. This site was not visited by us in 1962.

The pair occupying the site south of Mount Pelly was not observed regularly. We first visited the nesting bluff on June 18, 1960, finding a fresh but eggless nest within inches of an old one on flat ground—on the very top of the bluff. Actually, the new nest was not used, for Waters, on June 29, collected a "well incubated" set of five eggs from still another old nest that we had failed to find on this same bluff. No hawks defended this site or adjacent areas in 1962. The three pairs on Mount Pelly were the only ones observed with any regularity. All three nested on the northerly, least sheltered side where the aspect was severe but the slope fairly steep. The nests, large and bulky and composed mostly of dry willows lined afresh, were anchored to

¹A nest on a steep bank of the West Arm reportedly held four young in 1966, when lemmings were moderately abundant in the area. According to Fred Ross and Nick Jones (pers. comm.), only two young were in the nest by early August.

boulders in old scree. Caribou bones in addition to willows had been used in the construction of one. The ground about but noticeably below the nests was covered with luxuriant vegetation—evidence enough that the sites were ancient. Two other nests not in use were falling apart and were evidently long abandoned. All these nests were readily accessible to mammalian predators.

Two of the active Mount Pelly nests were first noted June 8. The clutch of five eggs at one (Nest 1) was complete then, and incubation probably had started by June 1, possibly earlier. The other nest (Nest 2) had four eggs and later five eggs. Nest 3 was not discovered until June 16. In it were four eggs, apparently the full clutch.

Nest 1 contained 5 eggs on July 2, three young and two eggs (one pipped at 5:00 P.M.) on July 6, five young on July 9. On August 11, 2:00 P.M., one of the young flew high overhead, obviously fledged. Three of the young bolted, two from the nest, one beside it, all flying off strongly. The fifth remained behind. Even if the aforesaid pipped egg hatched July 6, the young from that egg flew well at an age not greater than 36 days. On the other hand, two young had remained in the nest for more than 36 days but bolted when approached.

In 1962, Nest 1 was covered over with snow on May 24 and was not defended by either of two pairs that flew near the summit of Mount Pelly that day. The nest was later defended vigorously by one adult on June 5, and noteworthy is the fact that its lining had been replenished with fresh willows. Much down and feathers, but no eggs, were in the nest as late as June 13 when both adults defended the site at the same time. No hawks were seen anywhere near Mount Pelly by Sutton and Stephens during July and August. We conclude that copulation and egg-laying were not consummated at the proper time, if at all. An eggless but apparently refurbished nest was finally abandoned by a pair of Rough-legged Hawks on Banks Island during an extremely poor lemming year (Manning, *et al.*, 1956).

Nest 2, in 1960, contained one downy young, one young half out of the shell, and three eggs (one pipped) at 4:15 P.M., on July 6. On July 9, there were four young and one egg (pipped). Since the first four eggs had been marked by us on June 8 (7:00 P.M.), it is certain that the last egg was hatched last. It hatched at 6:00 P.M. on July 10, indicating an incubation period not greater than 32 days, probably 31 days. According to Olstad (*in* Witherby, *et al.*, 1958), the period of incubation for *Buteo lagopus lagopus* is "about 31 days."

The young of Nest 2 were also marked. On August 11, the first four flew strongly from the nest, flying at least a quarter mile before alighting. The second of the brood, 35 days and 13 hours old, was one of the four. The fifth sibling, 31 days and 12 hours old, bolted when touched, but it glided only thirty feet before falling and tumbling down the slope. It was hardly fledged. In 1962, this nest was completely covered with snow as late as June 5. No hawks defended it or any other area close by that year.

Nest 3, in 1960, contained one newly hatched young (down wet) and three eggs (one pipped) at 10:15 P.M. on July 9. At 11:30 A.M. the following day there were two young (both dry) and two eggs (one pipped), the two young hatching close together, probably within a 14-hour-period. On August 11, all four young were in the nest at 1:30 P.M. One flew from the nest but not

strongly. Another readied itself for flight but did not fly, and two crouched low in the nest. In tossing small pebbles at the nest, we failed to dislodge the three. The two oldest siblings were between 32 and 33 days old. In 1962, Nest 3 was covered with snow on May 24 but completely exposed by June 5. It was not, however, refurbished as was Nest 1. Except for a single hawk circling overhead near the site, it was not defended in the strict sense of the word.

The fledging period for the species has been stated to be forty or more days, e.g., Olstad *in* Witherby, *et al.* (1958). Although the fledging period for any bird is often academic, the forty-day period ascribed to this species needs some qualifying remarks. From our examples, it can be said that 31- and 32-day-old young are at best weak fliers. Some 36-day-old young fly strongly—as far as a half mile or more—and cannot be caught easily. Most young, nevertheless, remain in or near the nest for forty or more days.

The territories of the hawks on Mount Pelly were well defined in 1960, all three pairs remaining within their respective areas. In walking from one end of the mountain to the other, it soon became apparent that when the cries of one pair suddenly ceased, those of another were soon heard. At no time did we see two or more pairs protesting at the same time in any one area, even when the population was quite dense, as at Anderson Bay. The birds protested mostly by circling high and crying loudly. Occasionally they would swoop low overhead near the nest, not actually striking, however.

Departure

According to Snyder (1957), departure of Rough-legged Hawks from the Canadian Arctic takes place largely in October, the southward migration covering a broad continental front. Our latest record for both young and adult Victoria Island birds is August 26 (Wellington Bay, 1960). Almost certainly the species remains on the island much longer during good lemming years. During 1962, the poor year for lemmings, neither Sutton nor Stephens noted the species in the Cambridge Bay area after mid-June, despite the fact that they searched for the birds as late as September 12.

Food

With the single exception of a small Lapland Longspur nestling (Mount Pelly, July 2), the only prey seen at nests in 1960 were varying and brown lemmings. We found no prey, not even a fresh pellet, at any nest visited in 1962.

Banding

The following Rough-legged Hawks were banded in 1960: four siblings, five siblings, and four siblings in respective nests on Mount Pelly on July 31; four siblings in a nest near Cambridge Bay north of Cape Colborne on August 8; a fledged young that was retrieved from the waters of Anderson Bay and released in good condition on August 20. One of the Mount Pelly juveniles was preserved as a specimen on August 11 when it was not quite fledged.

Mr. Dale Horn, Conservation Officer, reported the one recovery to date.

The nestling banded (597-24408) near Cape Colborne on August 8, 1960, was found dead by Mr. Henry Popp in southern Idaho near Hill City, Camas County, on November 11, 1961. This locality lies within the known wintering area of *Buteo lagopus s. johannis*.

Specimens

One breeding female Rough-legged Hawk (weight 1,200 gm, wing chord 448 mm, tail 238, culmen from cere 25.0, tarsus 75.0, middle toe without claw 37.0) was collected at Anderson Bay on August 21, 1960. The bird was a light-phased individual in heavy moult. Several rectrices were new, and there were numerous body pin feathers. It had eaten one lemming.

The specimen is excessively large for *Buteo lagopus s. johannis*, all measurements falling close to the average for *Buteo lagopus kamtschatskensis* (see Friedmann, 1950). When compared with specimens of both races in the National Museum of Canada, its plumage is more like that of *s. johannis*. Inasmuch as specimens from the Mackenzie Delta to Coronation Gulf have been examined closely and assigned to *s. johannis* by Manning, *et al.* (1956), we refer this one odd specimen to the same race until more Victoria Island birds can be examined. According to Cade (1955), populations of Rough-legged Hawks adjacent to the Bering Sea show nearly a full range of variability of each character of both the North American and Asiatic populations.

One 31-day-old male juvenile (weight 845, wing chord 245, tail 116, culmen from cere 18.0, tarsus 71.0, middle toe without claw 33.0) was collected at the nest on Mount Pelly on August 11, 1960. Its remiges and rectrices were sheathed at the base, and there was much down, especially on head, throat, pectoral, side, and leg areas. Remains of lemmings were found in the alimentary tract.

One set of six eggs was collected on the Finlayson Islands on June 21, 1960.

Annual Breeding Cycle

Rough-legged Hawks return to southeastern Victoria Island before the thaw when the land is mostly snow-covered. Pairs visit the nesting places as early as May 24. During favourable years, egg-laying probably starts during the very last days of May, early clutches being completed by June 8. Nests that remain covered with snow longer than June 5 preclude early nesting and result in late nestings for some pairs. During years when the lemming cycle is at an extreme low, a few pairs return to the breeding places, repair and defend the nests but do not breed successfully. The sites are abandoned by July, or earlier, as are the breeding grounds. Apparently Victoria Island hawks breed when lemmings are moderately abundant. Precipitous areas are favourite nesting places, but the hawks will nest on scree, large erratics, and even on flat ground. Use of poor sites occurs during lemming peaks when cliff sites are at a premium. The clutch is four to six eggs, but whether smaller clutches ever occur commonly is uncertain. The period of incubation is about 31 days. Siblings hatch at different intervals; the first hatch as early as July 4. Downy young in the nest as late as August 4 represent unusually late nestings. Thirty-one-day-old birds fly weakly; some

36-day-old ones fly strongly. Most young probably remain in or near the nest for forty or more days. Most fledge in August, exceptionally later. It is not known when the adults and young leave the region in fall. Some Victoria Island hawks, virtually all light-phased birds, migrate to northwestern United States.

***Aquila chrysaetos* (Linnaeus) Golden Eagle**

A lone individual flying near the coast just east of the Augustus Hills on June 2, 1962, was the only Golden Eagle noted by us in southeastern Victoria Island and adjacent small islands. It is possible that Golden Eagles breed south of the Augustus Hills on the Kent Peninsula (mainland) where a specimen was collected by the *Fifth Thule Expedition* during 1923-24 (Hørring, 1937) and where the species has been noted recently by Eskimos (Fraser, 1957).

***Falco rusticolus* Linnaeus Gyr Falcon**

Gyr Falcons are rare on the coast of southeastern Victoria Island where the Peregrine Falcon breeds. Whether Gyr Falcons breed regularly in the remote interior is not known.

Although we failed to find the species anywhere in 1960, 1962, and 1966, these falcons have been seen perched on antenna masts within the settled areas of Cambridge Bay in the fall. Former personnel of the Royal Canadian Mounted Police Detachment described the plumage of these birds as grey rather than white. Precise dates were not recorded. Captain Joseph Bernard collected a white Gyr Falcon (specimen in National Museum of Canada) on Taylor Island on January 21, 1918.

***Falco peregrinus* Tunstall Peregrine Falcon**

Peregrines are uncommon on the coast of southeastern Victoria Island where widely scattered pairs nest at cliff eyries that are likewise scarce. A few pairs also breed at eyries on smaller coastal islands and far inland near large lakes. Although it would appear that the Peregrines of northern Canada belong to a distinct arctic race, the lack of specimens from Siberia precludes a much-needed study of the entire arctic population. Until this population is better understood, the Victoria Island birds are referred to the race *Falco peregrinus anatum*.

Peregrines visit Jenny Lind Island, but there is no evidence that they ever breed there (*see* Supplement, p. 219).

Previous Records

Porsild (1951) observed a clutch of three eggs near Washburn Lake on August 4, 1949. Fraser (1957) believed that the scarcity of cliff eyries in southeastern Victoria Island results in Peregrines "being scarce" there. His only observation of the species was made on August 28, 1955, when he noted two pairs "nesting" on rocky cliffs near the west end of Ferguson Lake. No reference was made to young.

Nesting

A Peregrine's eyrie was on a 100-foot vertical cliff back from the beach and near a gullery on the large outer island of the Finlayson group. When first seen June 20, 1960, no birds defended the cliff. The following day a small Peregrine, probably a male, flew back and forth above the rocks calling loudly, but it soon left. We failed to dislodge a female by firing near the well-marked eyrie or elsewhere along the cliff and conclude that no pair nested there in 1960. In visiting the same cliff on June 3, 1962, we found it actively defended by a pair of Peregrines. Since all ledges were covered with deep snow, egg-laying in all probability had not taken place. The male of the pair (collected) had considerably enlarged gonads.

Another eyrie was on the 100-foot cliffs rising precipitously near the northeast shore of Anderson Bay. When first noted August 20, 1960, it was defended vigorously by a pair (female collected) that had at least two fledged young. One young was collected there the following day while the male parent continued to defend the cliff, which was not visited in 1962.

A third eyrie was on a sheer sea cliff nearly 100 feet high at the south coast between Anderson and Cambridge bays. On August 21, 1960, a pair defended the eyrie that we failed to locate from the waters below; we did not see the young that were surely among the rocks. The cliff was not visited in 1962.

A fourth eyrie was on a bluff of basaltic rock rising from the beach near Starvation Cove, between Cambridge and Wellington bays. The nesting ledge, hardly 40 feet above level ground, was the only one seen that could be reached without climbing equipment. On August 28, 1960, a pair (female collected) defended four fledged young that flew boldly from the rocks. This eyrie was not visited in 1962.

A fifth eyrie was probably somewhere in the Mount Pelly region. Although a Peregrine was seen flying near the summit of the mountain on June 8 in 1960, and on June 5 in 1962, no pair defended any special slope there. The single birds may have been attracted to the mountain by screaming Rough-legged Hawks. Waters also observed the species in the Mount Pelly region in 1960 and thought that a pair may have been nesting on one of the larger islands in Greiner Lake near by, but the island was not visited. The species was last seen near Mount Pelly on July 18, 1962, by Sutton who noted one flying towards the mountain.

The Peregrines likely breed on the Richardson Islands and the coast of Victoria Island north of there, where one was seen from the air on August 8, 1960. Another likely nesting place is the high country (exact location not known) west of Kitiga Lake where personnel of the Fisheries Research Board of Canada reportedly were 'dived on' by Peregrines on June 11, 1962.

It is not known when egg-laying commences in southeastern Victoria Island. Captain Joseph Bernard collected an adult male and four eggs at Cape Hamilton in 1914 on June 22, and another adult male and two eggs there on June 27. Both skins are in the National Museum of Canada.

Food

An adult male Peregrine Falcon collected near its eyrie on the Finlayson Islands on June 3, 1962, had eaten a male Lapland Longspur.

An adult female collected near its eyrie at Anderson Bay on August 20, 1960, had eaten a juvenal Sabine's Gull; numerous remains of adult Sabine's Gulls were found at the eyrie. A fledged juvenal Peregrine collected near this eyrie on August 21 had eaten a lemming.

Specimens

One adult male Peregrine Falcon (weight 620 gm, wingspread 984 mm, wing chord 318, flattened wing 323, tail 150, culmen from cere 19.0, tarsus 51.0) was collected near its eyrie on the Finlayson Islands on June 3, 1962. It was very pale above and below, with relatively few dark markings ventrally; its eyelids, cere, legs, and feet were deep yellow.

Two adult females (weight 960 to 1,025, wing chord 348 to 358, flattened wing 352 to 362, tail 171 to 175, culmen from cere 21.5 to 22.0, tarsus 54.0 to 55.5) were collected at eyries in 1960 respectively at Anderson Bay on August 20 and on the south coast between Cambridge and Wellington bays on August 28.

One fledged female juvenile (weight 925, wing chord 309, tail 178, culmen from cere 21.5, tarsus 55.0) was collected at an eyrie at Anderson Bay on August 21, 1960. Its remiges and rectrices were sheathed at the base.

Annual Breeding Cycle

Peregrine Falcons actively defend eyries in southeastern Victoria Island as early as June 3 when nesting ledges may be covered with snow. The eyries are inland as well as coastal. Little is known of the egg-laying and incubation periods for the region. Fledged young occur at the eyries as early as August 20 and as late as August 28, at which times they are still attended by adults.

Falco sparverius Linnaeus Sparrow Hawk

A Sparrow Hawk was seen by Gary Gagan and others entering one of the buildings at the DEW-Line Station on Jenny Lind Island during an unusual warm spell in mid-May (precise time not recorded) in 1966 and was being driven off when a large hippoboscid fly was seen circling its body. This bird was likely one of two adult males found dead on the station grounds by Eskimo children that year on June 1 and 23. Heretofore the species had not been reported from the Canadian Arctic Archipelago.

Specimens

Two adult male Sparrow Hawks (*Falco sparverius sparverius*) were found dead on Jenny Lind Island in 1966 on June 1 and 23 respectively. Both birds were extremely emaciated (weight: 79.4 and 60.6 gm) and probably had died of starvation earlier in May that year. A dead hippoboscid fly was found on the June 1 specimen and was later preserved in alcohol.

Lagopus lagopus (Linnaeus) Willow Ptarmigan

Willow Ptarmigan probably breed in many places in southeastern Victoria Island where they are moderately abundant some years, scarce in others. Less evenly distributed than the more abundant Rock Ptarmigan, they occur chiefly near the coast in the Cambridge Bay area. Willow Ptarmigan also breed on Jenny Lind Island where their numbers are cyclic (*see* Supplement, p. 219). In both places they are best referred to the race *Lagopus lagopus leucopterus* or White-shafted Ptarmigan.

Previous Records

Ptarmigan have often been reported from southeastern Victoria Island, but few of these birds were identified to either species. Captain Joseph Bernard evidently collected a number of Willow Ptarmigan on or near the east coast at De Haven Point and Taylor Island. Ten specimens from these areas were used by Taverner (1932) in his description of *leucopterus*, although the type locality is on the west coast of Baffin Island. In 1954, Ellis (1956) reported seeing pairs of Willow Ptarmigan in autumn plumage near Cambridge Bay during August, and six flying juveniles there on August 14. In 1955, Fraser (1957) found ptarmigan abundant in many places in southeastern Victoria Island, especially near Padliac Inlet, but he referred all these birds to genus only.

Pre-nesting

Willow Ptarmigan were fairly abundant on the wintry coastal slopes of Cambridge Bay in May of 1962. They were noted most often at the edge of settled areas, by the airstrip, gasoline caches, and various outlying buildings and structures. It was difficult to imagine why these readily available birds were not hunted then by the Eskimo who lived close by.

When we first visited these slopes on May 11, Willow Ptarmigan were going about in mixed flocks. Males were rapidly acquiring their head and neck spring feathers. Gonads of two collected during May 11-14 were somewhat enlarged (largest testis measured 12.0 x 6.0 mm). Females in these early flocks appeared to be white, but specimens taken then clearly showed incoming summer feathers.

The males that were collected during May 11-14 had recently eaten twigs and buds of the willows *Salix richardsonii* and *arctica*; they had also eaten a few seed pods of *Oxytropis* sp. Five females collected during May 11-12 had eaten twigs (some an inch long) and buds of these same willows; they had also eaten many twigs and leaves of *Dryas integrifolia* and, to a lesser extent, seed pods of *Oxytropis* sp.; one had eaten seven willow leaf galls.

Some Willow Ptarmigan were probably paired. On May 11 the male of a solitary pair performed a full flight display; but most flight displays seen then were half-hearted attempts. One individual, flying off with 13 ptarmigan, suddenly cackled and displayed in mid-air. However, he flew on without descending and eventually caught up with the others.

A few Rock Ptarmigan, every one a male so far as known, flocked with the Willow Ptarmigan in May. Some of these males were in a courting mood.

On the north shore of Greiner Lake on May 19, at least 10 miles from Cambridge Bay, a male Rock Ptarmigan repeatedly courted a hen Willow Ptarmigan in the presence of her mate (incident discussed under Rock Ptarmigan). It was not unusual to find Rock Ptarmigan well back from the coast, but this was our only observation of Willow Ptarmigan so far inland from Cambridge Bay. Much tundra north of Greiner Lake was essentially wet and suited to the species.

By May 20 some Willow Ptarmigan males sported bright heads and necks. Although a few were still going about together, the larger flocks had disappeared. Pairs definitely were scattered by the end of the month. No longer were the birds common on the coastal slopes. They were in the wet tundra breeding areas by the time the thaw was rapid.

The ground occupied by a pair was made conspicuous not only by numerous droppings but also by white feathers shed by the hen. The male was now belligerent and noisy. He strutted with puffed-out feathers and comb elevated and was quick to flush. Once flushed he invariably performed a flight display. Flying short distances, 10 to 15 feet high, he cackled and fluttered all the way to the turf, sometimes continuing the wing fluttering for a few seconds on the ground. Sometimes he alighted close to the brownish hen which remained quiet and hidden.

Nesting

Willow Ptarmigan were seen only occasionally near Cambridge Bay in 1960. The female of a pair seen June 3 was in summer plumage or nearly so. The species was next seen on June 12 (pair feeding, solitary male flying), but not again until July 11 when Waters found a pair with 12 downies, probably not more than a day or two old. Allowing 22 days for incubation (Conover, *in* Bent, 1932), egg-laying by this pair had started no later than June 7. The pairs seen that year were widely scattered, but all were within two miles of the bay.

Willow Ptarmigan were much more numerous in 1962, although the nesting pairs were well scattered, perhaps a mile apart on the average. The one nest found was a mile from the bay in wet tundra upgrown to willows two to three feet high. This area appeared to be typical of the habitat occupied by the nesting pairs. According to Fred Ross, the nest was on a grassy hummock in an open spot among the willows and held seven eggs on June 27 or thereabout. The broody hen was actually lifted from the eggs. Her mate was close by. Some investigators believe that the male may abandon the nesting area following egg-laying, rejoining the hen after the eggs hatch (Manning, *et al.*, 1956).

We first visited the site on July 9 and eventually found the male, but not the female and nest. The white body plumage of the cock was badly soiled, having not yet been replaced with summer feathers.

In this same area, on July 27, Sutton and Stephens found a pair with young which flew well. The cock feigned injury, but not the hen which ran off with the brood. One of five chicks seen that day was collected. It had recently eaten seeds of *Polygonum viviparum* and small green leaves.

Likely this family was the one seen in this very area on July 30. Six chicks

were seen that day. The cock (collected) had recently eaten many leaves of *Salix reticulata*, about 50 seeds of *Polygonum viviparum*, several seed heads of *Dryas integrifolia*, one seed head of *Chrysanthemum integrifolium*, and a few grass seeds.

Willow Ptarmigan were widely scattered over Jenny Lind Island in 1962. Males occurring near one another, in one instance actually fighting, indicated that the territories of some were close. Most pairs were a mile apart, usually in wet tundra, also in sandy areas. Willows were everywhere dwarfed on Jenny Lind Island and were not nearly so conspicuous an element as at Cambridge Bay. Willow Ptarmigan habitat nevertheless contrasted sharply with the somewhat higher stony slopes and ridges occupied by Rock Ptarmigan.

A Willow Ptarmigan nest in a grassy hummock in wet tundra held 13 eggs on June 22 and 14 eggs on the 23rd, indicating that egg-laying had started no later than June 9. Another nest, in a sandy area where lichens and grass-like sedges were conspicuous, held 12 fresh eggs on June 24. The nests were hollows lined with dry sedges and grasses and ptarmigan feathers; willow twigs and leaves, lichens, and bits of moss and other plants were less important constituents. A cock ptarmigan stood guard in the vicinity of each of these nests.

Late Summer Records

In 1960, within a half mile of Wellington Bay, flocks of 9 and 12 Willow Ptarmigan were noted respectively on August 26 and 27. The plumage of these birds was piebald. The extensive wet tundra near Wellington Bay appeared to be ideal for the species.

In 1962, Sutton and Stephens observed several Willow Ptarmigan that had been shot by Eskimos on September 3. These birds were largely in winter feather, indicating that the moult had been rapid. This was our latest date for the species, although it surely occurs there much later in the year.

Specimens

Six adult males were collected: one at Cambridge Bay on June 3, 1960; three at Cambridge Bay in 1962 on May 11, 14, and July 30 respectively; two on Jenny Lind Island in 1962 during June 23-24. Weights (gm) and measurements (mm) of the six: weight 610 to 800 (av. 696.33), flattened wing 212 to 224 (218.5), tail 117 to 131 (122.5), bill from anterior edge of nasal fossa to tip 10.0 to 12.0 (11.08). The male collected July 30 was in summer plumage. The pale brown feathers of its head and neck were being replaced by rich brown feathers; its body feathers were mostly brown except for the belly, which was extensively white with only a scattering of brown feathers. Only three old rectrices remained; its primaries had been replaced except for the three outermost ones on each wing.

One individual of uncertain sex was found dead in a rapidly thawing snowbank near Cambridge Bay on June 11, 1960. Its large size (flattened wing 219, tail 129, bill from anterior edge of nasal fossa to tip 12.5) indicates that it is a male. It has no obvious summer feathers and probably died long before it was discovered.

Seven adult females were collected in 1962: five at Cambridge Bay during

May 11-12, and two on Jenny Lind Island during June 23-24. Weights and measurements of the seven: weight 590 to 698 (652.71), flattened wing 195 to 207 (201.42), tail 110 to 118 (114.0), bill from anterior edge of nasal fossa to tip 10.5 to 11.0 (10.71). Females collected at the nest during June 23-24 had large brood patches; their plumage was brown with only a few scattered white feathers; there was no extensive replacement of flight feathers.

According to Taverner (*ibid.*), the first outermost primary shaft of *Lagopus lagopus leucopterus* is almost always immaculate, the second often more or less clouded, the remainder (innermost) having the colour entirely absent or greatly reduced. The two Jenny Lind Island males clearly show this condition, as do two Cambridge Bay males. Two other Cambridge Bay males show more colour than expected, especially in the third, fourth, and fifth primaries; one also has a trace of colour in the first outer primary. The unsexed bird, probably male, has the most colour of all.

The above Jenny Lind Island females have very little colour in the primary shafts, even less than described for *leucopterus*. Cambridge Bay females grade from light to fairly dark, and in this respect are similar to males from that area. Although the Cambridge Bay birds appear to be somewhat influenced by a different race, they are best referred to *leucopterus*.

One small but fledged female juvenile (wing chord 116, tail 50.0) was collected at Cambridge Bay on July 27, 1962.

Two sets, one of 14 eggs and the other of 12 eggs, were collected with nests on Jenny Lind Island respectively on June 23 and 24 in 1962.

Annual Breeding Cycle

Arrival of Willow Ptarmigan in southeastern Victoria Island has not been recorded. Numbers of these birds are highly cyclic. During years of abundance, mixed flocks are fairly common on the snowy coastal slopes by May 11. Some pairing takes place then, but courtship displays are both infrequent and indifferent. Males first become conspicuous through the acquisition of brown head and neck feathers, which are dense in some birds by May 20. Summer feathers of the hens are not conspicuous until late May when the moult is rapid. The large flocks break up, and the pairs disperse widely in late May and early June when the thaw is under way. Courting is intense at this time. The nesting habitat in southeastern Victoria Island is wet tundra upgrown to fairly high willows, chiefly near the coast; on Jenny Lind Island, where willows are stunted, it may be wet tundra or sandy areas; in both regions it is essentially low terrain, not stony elevations. Egg-laying in both regions begins in early June, continuing into mid-June. Since the clutch may be as large as 14 eggs, laying may continue into late June. The clutch, however, may be as small as seven eggs. The hen incubates, the cock stands guard near by, not necessarily abandoning the nesting area at the onset of incubation. He retains his spring plumage (brown head and neck, white body) until mid-July, when the moult of body and flight feathers is rapid. By the end of the month his body plumage is mostly brown except for the belly, which is white. Moult is probably later in hens. Chicks in the Cambridge Bay area hatch as early as July 11. By late July some chicks are

flying and feeding on plants. Little is known of the behaviour and moults of adults and juveniles in August. Flocks, possibly family groups, occur in late August, at which time the plumage may be boldly brown and white. Some birds are mostly white as early as September 3. Whether the species remains in the region until late in the year is not known. Presumably most of these Willow Ptarmigan migrate south in winter. The Victoria Island population may be influenced somewhat by a more southern race of the species, as indicated by the presence of dark-shafted primaries in some Cambridge Bay birds. Jenny Lind Island birds appear to be relatively free of such influences.

Lagopus mutus (Montin) Rock Ptarmigan

Rock Ptarmigans nest commonly in the Cambridge Bay area and probably throughout much of southeastern Victoria Island where their numbers appear to be cyclic. The race that breeds there is not definitely known but may represent a *Lagopus mutus saturatus* > *rupestris* complex. The species also breeds commonly on Jenny Lind Island where the race appears to be *saturatus* (see Supplement, p. 220).

Previous Records

Clearly identifying the Rock Ptarmigan, Rae (1852) stated that many were noted during his spring trip to Wilbank Bay and the coast west of there in 1851. Collinson (1889) likely had this species in mind when he mentioned that a "large pack" of ptarmigan was noted at Cambridge Bay on October 6, 1852. Rock Ptarmigan specimens were taken in southern Victoria Island by Captain Joseph Bernard, but localities and dates are vague. Ellis (1956) noted adults in autumn plumage and flying juveniles at Cambridge in 1954 on August 14 and 17. Although Fraser (1957) failed to distinguish between the two species, he stated that ptarmigan were very common in southeastern Victoria Island in 1955, noting the genus at Cambridge and Anderson bays and Padliak Inlet.

Early Flocks and Pairing

Rock Ptarmigan were going about in flocks at Cambridge Bay in mid-May of 1962. They occurred here and there throughout the lowlands and were fairly common on the snowy coastal slopes near the settlement. There they associated freely with Willow Ptarmigan. These early flocks of Rock Ptarmigan appeared to contain males only.¹ All the specimens collected then proved to be males, including seven from 11 birds that were flocked several miles inland on May 15. The largest testis of each of the seven was approximately 10.0 x 8.0 mm.

Crop contents of seven male and two female Rock Ptarmigan collected during May 12-23 that year were examined. It was ascertained that 60 per cent of the food consisted of buds and twigs of *Salix* sp., probably *Salix arctica*; 32 per cent leaves and twigs of *Dryas integrifolia*, 5 per cent branch ends of *Saxifraga oppositifolia*; 3 per cent leaves, scrapes, and seed pods of *Draba* sp., and willow leaf galls.

¹Segregation of the sexes in winter would appear to be widespread in Rock Ptarmigan, probably in Willow Ptarmigan also (see Weeden, 1964).

A change in attitude of the male was evident May 19. Not only were solitary individuals scattered on the tundra then, but one performed flight songs or aerial displays, although we failed to find a hen which may have been close by. In low country, near the north shore of Greiner Lake, a male Rock Ptarmigan and a male Willow Ptarmigan, without the least show of animosity, together followed a hen Willow Ptarmigan. When the hen flew and alighted a hundred yards away, the Rock Ptarmigan quickly followed and performed a flight song before fluttering down beside her. Bringing up the rear, the Willow Ptarmigan performed and alighted near the two. This entire act was repeated in precisely the same manner. Leaving the trio, we returned several hours later and this time found an additional Willow Ptarmigan hen. Eventually the four birds flew off together and were not seen again.

Female Rock Ptarmigan were not definitely observed before May 23, when a cock and two hens (collected) flew about together near the bay. Pairs were seen occasionally thereafter, but it is difficult to account for the mixed flock of male and female birds near the bay as late as May 28. There were 12 of them altogether—perhaps a flock of newcomers. This was the only mixed flock of Rock Ptarmigan seen anywhere by us that spring.

The greatest concentration of pairs and displaying males seen was at the Augustus Hills in 1962. During the evening of June 2 the slopes were fairly alive with Rock Ptarmigan. Males performed every few hundred yards, and it was not uncommon to see two, even three, birds performing simultaneously. There was much fighting among males, which in itself was good evidence of a dense population. Eskimos shot many of these birds for dog food. At a camp visited June 3, we examined ten freshly killed ptarmigan, nine of them males. A heavy kill was indicated by a scattering of feathers about camp. Still, there were lots of Rock Ptarmigan in the Augustus Hills where we failed to note a single Willow Ptarmigan. In crossing Dease Strait in the direction of the Finlayson Islands, we saw a solitary Rock Ptarmigan flying low across the ice.

Scattered pairs were noted at Cambridge Bay on days following. Not nearly so concentrated as at the Augustus Hills, they were more abundant than in 1960. Some females had almost a third of their summer feathers by May 29, but others were mostly white as late as June 5. Males kept their winter feathers a long time following the moult in females.

Nesting

Rock Ptarmigan frequented many types of summer habitat in the Cambridge Bay area. Some occupied the wet tundra along with Willow Ptarmigan, but much of that ground was littered with rock and overrun with innumerable knolls and ridges. Rock Ptarmigan, but not Willow Ptarmigan, also occupied the high, barren ridges, including the slopes of Mount Pelly. The two species were more segregated on Jenny Lind Island. There the Rock Ptarmigan inhabited the rocky ridges, mostly avoiding the extensive lowlands that were wet, peaty, or sandy, and occupied by Willow Ptarmigan.

The female of a pair shot at Cambridge Bay on June 3, 1960, had been laying eggs, judging by the reproductive organs. This bird was largely white,

but many incoming summer feathers were evident. On June 21 that year, Waters found 13 eggs in a dry scrape lined with leaves and dead vegetation beneath a willow in wet tundra. These eggs had fairly large embryos, at least a week old. Waters found the nest by spotting the whitish male as it sat beside the incubating hen. This was the only active nest recorded at Cambridge Bay, although we found one, long abandoned, near the settlement in 1962 on June 14. The scrape was in meagre vegetation in a rather barren, disturbed place overlooking the bay. Bleached shells and membranes indicated a successful nesting of a season past.

Three active nests were observed on Jenny Lind Island in 1962. The first was a lined scrape in a mat of green vegetation surrounded by huge boulders on a ridge overlooking the sea. The male of this pair regularly patrolled an area several hundred yards away but did not give a clue to the whereabouts of the nest, which was found eventually by spotting the incubating hen. There were 11 eggs that were nearly fresh on June 25. The second nest was on a high, fairly well-vegetated slope several miles from the sea. The hen of this nest had fed with her mate before flying fully a quarter mile directly to the lined scrape. There were 11 eggs with week-old, perhaps older, embryos on June 27. The third nest was found June 28 by Sutton who spotted the eggs when both parent birds were away. These eggs were on an unlined spot of turf in a water-filled depression by rock beaches near the sea. The 10 eggs contained large embryos, suggesting egg-laying in early June.

The identifiable egg of a Rock Ptarmigan was recovered from a Parasitic Jaeger that was collected June 26 on Jenny Lind Island. Predation of ptarmigan by jaegers and owls is likely highest during lemming lows.

The hatching period of the Rock Ptarmigan escaped our attention, and we have no data concerning it. The first juvenile seen in 1960 flew strongly with its female parent on July 25. Presumably this bird was the lone survivor of a brood. In the vicinity of Mount Pelly, where pairs appeared to be locally common in 1960, we came upon two separate families on August 4. The first consisted of 11 chicks and the female parent; the other, seven chicks and both parents (collected). Near Mount Pelly a hen (collected) and four chicks were noted August 11. Near Cambridge Bay a hen and eight chicks were noted August 15. A mixed group of at least 20 ptarmigan was encountered near Greiner Lake on August 16. The group split, with a pair (collected) and eight young going off in one direction. Whether adults were with the other group is uncertain. All these August young were large and flew strongly (*see Specimens below*).

In 1962, half-grown juveniles were seen near Mount Pelly on July 29—a pair with seven young and a hen with seven young. Near the settlement of Cambridge Bay a hen and 11 fairly large chicks were noted August 2.

Late August and September Records

In 1960, a flock of at least 10 Rock Ptarmigan was seen near the beach at the south coast between Anderson and Cambridge bays on August 21. A flock of 16 birds was noted near the settlement of Cambridge Bay during August 26–27. In the same vicinity, a flock of 18, including at least two

adults, was noted August 29. These birds, the last recorded that year, were piebald, the young being fully as large as the adults.

In 1962, a hen and three young were noted several miles north of the settlement of Cambridge Bay on August 21. Near Mount Pelly, on August 24, a hen and seven chicks were noted. The hen had eaten several bear-berries (*Arctostaphylos rubra*), most of them red, some green. The crop of a male juvenile collected then contained mostly grass seed, but also willow leaves and buds, some bear-berries, seeds of *Polygonum*, chickweed (probably *Cerastium* sp.), and bits of sedge.

Specimens

Salomonsen's (1950-51) statement that *Lagopus mutus saturatus* extends across northern Baffin Island and along the mainland to Coronation Gulf is supported by studies on Adelaide Peninsula by Macpherson and Manning (1959) and Prince of Wales Island by Manning and Macpherson (1961). These authors based their conclusions chiefly on specimens in the National Museum of Canada and descriptions given by Salomonsen (1936, 1950, 1950-51). Inasmuch as Greenland material is not available to us at present, we can add little to what has already been stated.

The relatively few specimens in coloured plumage from Cambridge Bay would appear to be *saturatus*, although some birds show characteristics of *rupestris*. This is especially true of adult males in autumn plumage. When the total picture is better understood, the Cambridge Bay area may prove to be a zone of intergradation.

Two adult female specimens (weight 520 to 525 gm, flattened wing 186 to 190 mm) collected on Jenny Lind Island in 1962 respectively on June 25 and 29 were very yellow and referable to *saturatus* on that basis. The one male (weight 502, flattened wing 197) collected there June 25 had too few summer feathers for taxonomic value.

Seventeen adult males were collected at Cambridge Bay: eight in 1960 during June 3 - August 16; nine in 1962 during May 12-23. Weights and measurements of 14 essentially in winter feather (May 12 - June 26) were: weight 450 to 575 (av. of 11 was 536.36), flattened wing 191 to 203 (196.92). A July 10 specimen (weight 500, flattened wing 191) was in summer plumage, being mostly brown above and white below. An August 4 specimen (weight 550) was acquiring its autumn plumage; all but one of its outer primaries had been replaced by new ones that were not full length; white belly feathers of the fresh winter plumage were evident. An August 16 specimen (weight 510) had much of its autumn plumage; its new rectrices were not full length; fresh white belly feathers were conspicuous.

Ten adult females were collected at Cambridge Bay: two virtually in winter feather on May 23, 1962; two piebald individuals in 1960 respectively on June 3 and 7; two with extensive summer plumage in 1960 respectively on June 26 and July 25; one with conspicuous autumn plumage and hidden fresh white belly feathers on August 4; three with extensive autumn plumage and conspicuous fresh white belly feathers respectively on August 11 and 16, 1960, and August 24, 1962. Weights of nine were 480 to 550 (514.88). Flattened wing measurements of eight with old primaries (May 23 - August

16) were 183 to 189 (185.5). Two specimens (August 11 and 24) had replaced their old primaries with new ones that were not full length.

Two large birds of the year were collected at Cambridge Bay in 1962: a male (weight 472, flattened wing 187) on August 24; a female (weight 411, flattened wing 190) on August 21. The outer two white primaries of these birds were longer than the third incoming primary—a moult pattern typical of this age. Their plumages were mostly dark, but the incoming fresh white belly feathers were conspicuous.

Three somewhat younger birds were collected at Cambridge Bay in 1960: two males (weight 305 to 315, flattened wing 142 to 154) on August 4; one male (weight 440, flattened wing 181) on August 16. All three had some dark primaries of the juvenal plumage. Fresh white belly feathers were present in all three, being conspicuous only in the August 16 specimen.

Two sets of 11 eggs each with nests were collected on Jenny Lind Island in 1962 on June 25 and 27 respectively.

Annual Breeding Cycle

More common some years than others, Rock Ptarmigan males flock on the snow-covered tundra during mid-May in southeastern Victoria Island. They feed chiefly on *Salix* and *Dryas* at this time and associate freely with Willow Ptarmigan. Aerial display and probably pairing start by May 19, but females have not been recorded there before May 23. Mixed flocks of both sexes in late May appear not to be common. Many Rock Ptarmigan are paired by early June when aerial display approaches a peak in activity. The nesting habitat is variable. It is usually dry and rocky, sometimes barren and high; it may also be well vegetated, even wet tundra where Willow Ptarmigan breed. The two species segregate for the most part during nesting, however. Egg-laying starts by June 3, possibly earlier. The clutch may contain as many as 13 eggs. The female alone incubates, but the male remains close by, at least during early stages of incubation. Information on incubation, hatching, and fledging is lacking for the region. Some young fly by July 20. Hens invariably, cocks sporadically, are with the brood. Some family groups flock as early as mid-August. The moult into summer plumage is rapid in females but much delayed in males. Once the moult is underway the males may replace their primaries before females with broods. The autumn plumage in both sexes is conspicuous during mid-August. The incoming winter plumage makes the Rock Ptarmigan of all ages and sexes appear piebald in late August. Typical of ptarmigan breeding at higher latitudes, the coloured plumages are worn only three months each year.

Grus canadensis (Linnaeus) Sandhill Crane

Sandhill Cranes (*Grus canadensis canadensis*) are uncommon in southeastern Victoria Island where a few widely scattered pairs no doubt breed.

The only cranes seen by us at any time on Victoria Island were five flying together along the Augustus Hills on June 3, 1962. The birds flew low over the fast-thawing tundra near the coast, calling often and loudly as they went. We failed to find the species on Jenny Lind Island, although much of the terrain there seemed suitable for cranes (see Supplement, p. 220).

Previous Records

Two Sandhill Crane eggs (in British Museum) were collected at Cambridge Bay in 1853 by members of H.M.S. *Enterprise* under Collinson (Oates, 1902). Gillham (1941) noted six cranes, presumably at Cambridge Bay in 1938, but provided no details.

Arrival and Nesting

According to Eskimo David Koomyuk, a few cranes have bred at Byron Bay. Koomyuk insisted that the birds nested early, so early that the eggs sometimes froze. This suggests that the pairs occupied the nesting grounds as early as mid-May, as they do on Banks Island (*see* Manning, *et al.*, 1956).

Koomyuk has seen cranes near Mount Pelly but was uncertain whether they bred there or anywhere in the Cambridge Bay area. In early July 1962, DEW-Line Station personnel reported that an Eskimo boy had recently destroyed "two crane eggs" at a nest near Sturt Point, about 50 miles east of Cambridge Bay. Other than the downy specimen in the National Museum of Canada (No. 15393) from Walker Bay (July 14, 1917), we know of no other breeding places for Victoria Island.

Specimens

Three partial wings, probably representing two Sandhill Cranes, and part of a leg with entire foot were salvaged at an Eskimo hunting camp near the west end of the Augustus Hills on June 3, 1962. According to the hunters, the birds had been shot during June 1-2.

One wing, showing brown immature feathers, measures 445 mm (chord); its apparent mate, somewhat twisted out of shape, measures 434. Satisfactory measurements cannot be taken for the remaining wing. The tarsus, though broken, is about 170 mm long; the middle toe without claw is 65.0 mm long. These measurements fall well within the range of the nominate race.

***Charadrius semipalmatus* Bonaparte** Semipalmated Plover

Semipalmated Plovers appear to be highly local summer residents in southeastern Victoria Island. A few pairs breed on Jenny Lind Island where the species is uncommon.

In the Cambridge Bay area these plovers were conspicuous within or close to the settled areas but scarce elsewhere. A single adult feigning at a lake near Mount Pelly on July 8 and a pair behaving as though they had chicks there on July 18 indicated that the species bred well back from the marine beaches in 1962. The single bird noted in the Augustus Hills on June 2, 1962, may have been a transient.

Previous Records

Ellis (1956) noted "downy young" at the Cambridge Bay settlement on August 6, 1954. Fraser (1957) noted "a pair" near Mount Pelly on June 18, 1955.

Arrival

One Semipalmated Plover was observed near the settlement of Cambridge Bay the day of our arrival there in 1960, May 31. Two birds noted June 1 behaved as a pair. Courtship flights were noted first on June 2.

The species was not seen before June 1 in 1962 (one bird). Only solitary individuals were observed until June 5 when two pairs were noted. Two separate individuals were also noted below Mount Pelly that day. Flight singing was first observed on June 6. Individuals flew erratically along the beaches and adjacent slopes, usually 10-30 feet up, and called repeatedly. The usual call during flight was the well known *kip-kip-kip* or *kif-kif-kif*. Notes resembling *cree-ah-cree-ah* were also given on the wing. Flight singing continued into mid-June.

In 1966, we noted performing individuals in the Cambridge Bay area on May 29 and 30.

Nesting

Semipalmated Plovers nested from just above the beach to the tops of the stony ridges overlooking the coastal slopes of Cambridge Bay. Preferring the artificial environment, they commonly occupied areas where the ground had been scraped by heavy road equipment, often near buildings or various other structures. Perhaps as many as 20 pairs bred along the settled coast of Cambridge Bay in 1960. These plovers appeared to be somewhat more abundant in 1962.

The nest scrapes were in dry ground and lined for the most part with pebbles, lichens, willow twigs, and dry leaves. One observed by Waters was in "wet grass," but the ground all about this atypical site was dry.

Egg-laying at Cambridge Bay in 1960 started no later than June 14, for an Eskimo child showed Waters a nest that held one egg on that date. Another held four eggs when first seen on July 2; since the eggs hatched during July 11-12, egg-laying had taken place in mid-June.

A nest with two eggs was found as early as June 11 in 1962. Two additional nests, only 150 yards apart, each with four fresh eggs, were found respectively on June 15 and 19. One nest was within 50 feet of a building.

In all observed nests the clutch size was four eggs. Both sexes were live-trapped at one nest shortly following egg-laying, and both sexes were observed incubating at another nest shortly before the eggs hatched; it was not determined which sex incubated the most.

The third egg of a four-egg clutch was in the nest for 23 days, 19 hours, 30 minutes (error not greater than three hours); the fourth egg was incubated for 22 days, 23 hours (error not greater than six hours). The two eggs hatched in less than 10 hours of each other, indicating that incubation had started with the fourth egg. The last egg of another nest hatched at least 30 hours after the first three eggs had hatched, indicating incubation before completion of the clutch.

Hatching at Cambridge Bay was recorded during July 6-13. Although the period of fledging was not determined, some young probably were flying strongly by August. Of a flock of five flying birds noted by Stephens on August 1, 1962, three appeared to be juveniles. A flying juvenile attended

by an adult was noted August 9, 1960. An unattended juvenile was collected at the beach that year on August 17.

A few pairs nested on Jenny Lind Island in 1962. One pair occupied a stretch of rather high, gravelly, raised beach. Another pair was near the DEW-Line Station airstrip. Still another had four well-incubated eggs in a very artificial site near the station dump on June 30 (*see* Supplement, p. 220).

Departure

Semipalmated Plovers were scarce at Cambridge Bay in late August, and the few birds seen then were not identified to age. The species was last seen there in 1960 on August 24 (two birds) and in 1962 on August 29 (one bird).

Banding

The following Semipalmated Plovers were banded at Cambridge Bay: two siblings in the nest on July 11, 1960; an adult male and its mate at their nest on June 16, 1962; two siblings in the nest on July 6, 1962.

One of the 1962 siblings was seen in the vicinity of the nest site on July 14 when eight days old; one (fledged) was seen there on August 9 when 34 days old.

Specimens

Four adult males were collected: two at Cambridge Bay in 1960 during July 22-25; two on Jenny Lind Island in 1962 during June 28-29. Weights (gm) and measurements (mm) of the four: weight 40.0 to 46.0 (av. of three birds 43.0), wing chord 115 to 120 (118.0), tail 54.5 to 58.0 (55.87), exposed culmen 11.0 to 12.5 (11.87), tarsus 22.0 to 25.5 (23.87).

Three adult females were collected at Cambridge Bay during July 23-28, 1960. Weights and measurements of the three: weight 39.0 to 42.0 (40.33), wing chord 114 to 122 (117.0), tail 55.0 to 56.0 (55.33), exposed culmen 11.0 to 12.0 (11.66), tarsus 21.5 to 23.0 (22.16). The moult of body feathers was slight and obvious only in the neck region. Fresh body feathers were present where the brood patches had been.

One fledged male juvenile (weight 41.0, wing chord 118) was collected at the beach of Cambridge Bay on August 17, 1960.

One downy female (weight 6.0, exposed culmen 7.0, tarsus 18.5) was collected at Cambridge Bay when 10 hours old on July 13, 1960.

Two downies of uncertain sex (weight of one 6.0, exposed culmen 6.0 each, tarsus 18.0 each) were collected at Cambridge Bay, respectively on July 12, 1960, and July 7, 1962.

Two sets of four eggs each with nesting material were collected at Cambridge Bay in 1962 on June 16 and 19 respectively.

Annual Breeding Cycle

Semipalmated Plovers return to Cambridge Bay during the last days of May or first days of June. Courtship flights may occur as early as May 29. Although a few breed inland at freshwater lakes, the birds are conspicuous only on the barren slopes adjacent to the sea, particularly in areas near

human activity. The nest site is essentially dry ground. Egg-laying starts as early as June 10 and probably culminates within a week. The clutch size is four. Incubation—by both sexes—may start with either the third or fourth egg. The period of incubation for the last egg of the clutch is 23 to 24.5 days. Family groups may remain within the general vicinity of the abandoned nest until after the young fledge. Some young probably are flying strongly by the first days of August. Unattended juveniles occur at the beach in mid-August. The species is everywhere scarce by August 20 and has not been recorded after the 29th. Nesting appears to be similar on Jenny Lind Island where the birds also favour artificial sites.

Pluvialis dominica (Müller) American Golden Plover

Golden Plovers are fairly common breeders in the Cambridge Bay area and likely in many places in southeastern Victoria Island. However, they appear to be uncommon some years on Jenny Lind Island where only a few widely scattered individuals and pairs were observed during June 19 to July 5 in 1962 (*see* Supplement, p. 220). Specimens from these areas are large and referable to the nominate race *Pluvialis dominica dominica*.

A Golden Plover was heard calling from the Finlayson Islands on June 3, 1962, but it is not known if the species ever breeds there. Three unattended juveniles were noted in a meadow near Anderson Bay on August 21, 1960. At Wellington Bay, during August 26–28, 1960, Golden Plover juveniles were the commonest waders observed on or near the beach.

Previous Records

Ellis (1956) stated that Golden Plovers were abundant at Cambridge Bay in 1954 when many adults and young were noted during August. Fraser (1957) considered the species common throughout southeastern Victoria Island in 1955, noting it near Mount Pelly on May 29 and June 18, near Anderson Bay on June 4, along the West Arm of Cambridge Bay on June 10, near Greiner Lake on July 2.

Arrival and Display

The first Golden Plover observed in 1960 was a solitary individual near the settlement of Cambridge Bay on June 1. The following day numerous calls were heard coming from inland, and a male and female travelled about as a pair. Several pairs were noted June 3. Pairs were widely distributed on the tundra June 4.

Arrival at Cambridge Bay in 1962 was similar.¹ The first Golden Plover noted flew in a blinding snow-storm near the bay on June 1. A solitary individual was later seen miles from there near the head of the bay. Near the outer coast a flock of five Golden Plovers flew swiftly over the tundra and suddenly dropped down in a snowless place on June 2. Numerous singles, twosomes, and small flocks of six birds or less fed on fast-thawing slopes of the Augustus Hills later that day. Both sexes were there, but it was not until

¹Arrival at Cambridge Bay in 1966 was early. Pairs (copulation noted) had formed by May 28. Flight displays were first observed on May 29.

June 3 that some of them behaved as though paired. Several individuals seen the same day far from land were flying across the ice of Dease Strait. Many pairs were established on the tundra inland from Cambridge Bay on June 4.

Early in June when much of the low-lying tundra was covered with snow, the pairs stood and fed in exposed places, often ridge tops. Territories were soon established and displaying occurred commonly above the snowy landscape. Aerial display was noted as early as June 3 in 1960. The first one noted in 1962 occurred June 4 when a pair flew low along a ridge top. Suddenly the trailing bird set its wings and displayed.

The usual flight display of the male was fairly high, often 100 to 150 feet up. It was a rather long, circling flight that covered a quarter to a half mile of tundra at times. Although the wing beats were steady and relatively deep, they were slow and hesitant. A slight pause seemingly followed each down stroke, producing a jerky or 'butterfly' flight. During flight he repeated *chu-leek*, or *too-lick*, again and again. The descent to earth was abrupt but less dramatic than the descent of the Black-bellied Plover. However, Walkinshaw (1948) saw flight displays that ended with a sudden drop to earth, followed by a rapid climb that carried the bird far out over the tundra. We saw nothing like that but did note occasional glides during the flight.

Ground displays were not often recorded by us. We did make the following observations on June 8, 1962. The male of a pair standing close together finished preening and directed his attention towards the mate. Stretching his wings high, and lowering them again, he ran several yards in overtaking the female. A swift copulation followed.

Nesting

Golden Plovers were scattered fairly evenly in low-lying tundra, about one pair per square mile, within five miles of the beaches of Cambridge Bay. Their numbers dropped off rapidly farther inland. In the vicinity of Mount Pelly they were scarce.

The usual nesting habitat was gentle peaty slopes, exposed but strewn with boulders, adjacent to hummocky wet tundra or the fresh waters. A few pairs occupied low, nearly flat, stony ridges. Nesting Black-bellied Plovers occupied essentially the same habitat but favoured the slightly higher, stonier, less vegetated areas.

The relatively few Golden Plovers that bred on Jenny Lind Island in 1962 favoured high ground that was stony and barren. On a great southerly slope immediately below the highest and most barren ridges of the island, a dozen scattered males but no females were noted June 20. Solitary males were observed occasionally on the barren coastal ridges near the northeast coast.

Several widely scattered pairs were observed on the highest land of the southeast peninsula of Jenny Lind Island on June 27. A set of eggs collected then contained small embryos, indicating a fairly late nesting. The only Golden Plovers noted anywhere in the extensive low-tundra areas were a solitary pair about three miles from the sea. This pair had a nest in a very barren, sandy area. The four eggs were not collected but appeared to be only slightly incubated when handled July 1. The much commoner Black-bellied Plover bred abundantly in the low tundra (*see* Supplement, p. 220).

Egg-laying at Cambridge Bay started early. In 1960, a nest with a single egg was noted on June 8. Two nests with four eggs each were observed June 14, and another found on the 15th also had four eggs. A nearly fresh set found by Waters on June 25 was the latest nesting recorded by us. In 1962, Sutton collected a female that was laying as early as June 9. Complete clutches at three nests were found during June 16-19; two nests with incomplete clutches of three eggs each were found respectively on June 15 and 17.

Nests were scrapes in peat or flat vegetation, sometimes beside a rock. They were exposed and lined with dry grasses, lichens, and dead leaves, chiefly of *Salix* and *Ranunculus*. The clutch size at sixteen Cambridge Bay nests and five Jenny Lind Island nests was invariably four.

At one Cambridge Bay nest under close observation in 1960, eggs were laid at two-day intervals. The female commenced incubating a day following the laying of the third egg, and a day before the laying of the fourth egg. The second and third eggs laid in this nest hatched first, on July 8; the first egg (marked June 8) hatched 10 hours later on July 8. The fourth egg hatched a day later on July 9. The third egg had been in the nest approximately 27 days before hatching. The fourth egg had been there about 26 days and four hours—the period of incubation for the last egg of the clutch.

Both sexes incubated eggs early and late in the period. The female appeared to incubate the most, but we did not make a special study of this behaviour. As with many other species nesting under exposed conditions, the incubating bird invariably left the nest well in advance of our approach. The bird on guard, usually the male, gave the alarm. Although the birds were reluctant to return to the nest, one or the other eventually walked to the eggs and settled down. When we approached the nest closely, the birds sometimes remained on the ground and called from a distance. Occasionally one or both of them flew out of sight but usually returned shortly. Often they ran in close and performed distraction displays of varied intensity. Within a few feet of us the displaying bird scuttled along with spread tail dragging on the ground, or it flattened out on the turf and wallowed with tail spread and both wings stretched far out. Both sexes sometimes performed simultaneously, but usually the female performed while the male stood some yards away and called incessantly. Drury (1961) described behaviour of this sort but stated that the birds merely crouched. Apparently he did not observe them lying prostrate on the ground after the manner of Black-bellied Plovers. We observed Golden Plovers of both sexes prostrate on the ground many times. The distraction display of the two species would appear to be very similar.

The first chicks were seen on July 8 in 1960 and on July 9 in 1962. Both sexes were solicitous of the young. One chick, a few hours old, left the nest but returned to be brooded; some young remained in the nest for 24 or more hours. The oldest siblings abandoned the nest well in advance of the last (youngest) sibling at one nest. Our latest date for a chick in a nest at Cambridge Bay was July 13, but hatching of late nestings must have occurred much later, conceivably as late as July 18.

One family (female colour banded) under observation in 1960 took the brood to hummocky wet tundra upgrown to fairly high willows a quarter mile from the abandoned nest. Both adults attended the young there from July 10 through July 25 but not thereafter. Another family of Golden Plovers,

from a nest not found by us, moved into the same wet tundra area. They, also, were not observed after July 25.

Many miles from there, in extensive wet tundra, a pair attended a large, well-feathered chick (*see* Specimens below) that could not fly on July 23. Flying juveniles were probably seen as early as July 30 and definitely by August 3. Both sexes attended the fledged birds. Juveniles may have been flying as early as August 1 in 1962, according to Stephens' observations.

Departure

Many Golden Plovers attended young in the Cambridge Bay area in late July of 1960, but they became scarce by August. A pair attended a fledged chick as late as August 3. Males attending young on August 4 and 6 were the last adults seen anywhere that year. Adults were common at Cambridge Bay in late July and the first days of August in 1962. They were seen fairly regularly up to August 8 but not thereafter. An adult flying with three juveniles as late as August 22 that year was an exceptional observation. In both years it was obvious that practically all adult Golden Plovers left the land well ahead of adult Black-bellied Plovers.

Flying juveniles were not definitely observed inland before August 3 in 1960. Up to the time of our departure on August 30, we saw them occasionally inland, usually on the barren tundra, sometimes in lush meadows. We did not record them at the beaches until August 26-28 when numerous singles and small flocks of six or fewer birds ran and fed along the Wellington Bay beaches.

Sutton and Stephens did not often visit the beaches in August or September, but they continued to find juveniles on the tundra between Cambridge Bay and Mount Pelly as late as September 9 (two birds). The largest flock noted contained 20 birds (August 18), but most flocks seen contained six birds or less.

Banding

One adult female Golden Plover was banded, and colour banded, near its nest at Cambridge Bay on July 7, 1960.

Eight downy young were banded in nests at Cambridge Bay in 1960: four siblings on July 8; four siblings, two on July 11, one on July 12, and one (623-20509) on July 13.

Golden Plover 623-20509 was recovered in Cass County, northeast Texas, some time in March of 1962, when approximately 20 months old.

Specimens

Eight adult male Golden Plovers were collected, six at Cambridge Bay in 1960 respectively on June 25, 25, July 23, 30, August 4, 6; one at Augustus Hills on June 3, 1962; one on Jenny Lind Island on June 20, 1962. Weights (gm) and measurements (mm) of the eight: weight 133 to 194 (av. 155.5), wing chord 165 to 183 (175.75), flattened wing 170 to 189 (181.12), tail 64.0 to 71.5 (67.87), exposed culmen 20.5 to 22.5 (21.68), tarsus 41.0 to 44.0 (42.43). Specimens taken late in the season showed considerable grey ventrally.

Four adult females were collected at Cambridge Bay in 1960 respectively on June 25, July 23, 23, 30. Weights and measurements of the four: weight 127 to 165 (148.75), wing chord 171 to 187 (178.5).

One male juvenile (weight 166, wing chord 174) was collected at Cambridge Bay on August 27, 1960.

Three female juveniles were collected in 1960: one at Anderson Bay on August 21; one at Wellington Bay and one at Cambridge Bay, on August 27. Weights and measurements of the three: weight 152 to 202 (175.66), wing chord 173 to 176 (174.66).

One flightless juvenile (sex uncertain, weight 95.0, wing chord 86.0) was collected at Cambridge Bay on July 23, 1960. Juvenal feathers were replacing the down, which was conspicuous in all areas except the back.

Five downy chicks were collected at Cambridge Bay: male and female siblings near the abandoned nest in 1960 on July 11; two male siblings and one female sibling at or near the nest in 1962 on July 9, 10, 12, respectively. The newly hatched chick weighed 19.0 to 21.0; its culmen was 10.0 to 11.0, its tarsus about 30.0. The female specimens have a pronounced golden pectoral band that is lacking in the males. Sutton made a direct-from-life painting of the male collected July 12, 1962.

Six sets of four eggs each with nest linings were collected: five at Cambridge Bay, three in 1960 respectively on June 14, 14, 25, and two in 1962 respectively on June 17 and 19; one on Jenny Lind Island on June 27. Measurements of the 24 eggs: length 44.9 to 52.8 (48.75), width 32.1 to 34.0 (33.12). These eggs are very similar to, but average a little smaller than, Black-bellied Plover eggs.

Annual Breeding Cycle

The first Golden Plovers appear in southeastern Victoria Island in late May or early June. Migration is rapid, and the majority arrive within a period of a few days. Newly arrived flocks are small. Aerial display starts as early as May 29 and probably attains its peak activity by June 10, declining rapidly thereafter. Pairs form early — many are already established inland by June 4. The favoured nesting grounds at Cambridge Bay are low, exposed, fairly dry, peaty areas near wet tundra or fresh waters. Pairs are scattered and attain their greatest density within a few miles of the marine beaches. The species prefers high ground on Jenny Lind Island, nesting on moderately vegetated slopes. Egg-laying starts as early as June 8. It continues into mid-June but appears to be uncommon after June 20, except on Jenny Lind Island where some pairs nest late. Eggs may be laid at two-day intervals. Incubation may start between the laying of the third and fourth eggs. Both sexes incubate early and late in the period; both display intensely near the nest. The period from laying to hatching of the last egg of the clutch is approximately 26 days. Most young probably hatch during July 8–15 at Cambridge Bay. Chicks may remain in the nest 24 hours or more; some leave the nest and return to be brooded. The youngest sibling may remain in the nest hours after the oldest siblings abandon the nest. Both sexes attend the chicks. They may attend them for two weeks in wet, willowy areas within a quarter mile of the abandoned nest. Juveniles probably start to fly during the very last days of July when some young are 22 days old. Both sexes attend fledged young,

but the last adults seen with juveniles are males. Adults of both sexes suddenly vanish in early August, and virtually all are gone by the 10th. Unattended juveniles occur regularly inland throughout August. Small flocks of six or fewer juveniles are common then. Occasionally as many as 20 flock. Juveniles also occur at the marine beaches and may at times be conspicuous. A few juveniles remain in the region as late as September 9. According to one banding return, some Victoria Island birds migrate north in March through eastern Texas.

***Squatarola squatarola* (Linnaeus) Black-bellied Plover**

The Black-bellied Plover breeds abundantly in the Cambridge Bay area where it is somewhat commoner than the Golden Plover near the coast and decidedly commoner farther inland. It likely breeds in many places across southeastern Victoria Island, since there are records from extreme eastern parts. It appears to be a fairly common species on Jenny Lind Island where, unlike the Golden Plover, it bred abundantly in 1962 (*see* Supplement, p. 220).

An adult and unattended juvenile were noted at the beach of Anderson Bay on August 20, 1960; two unattended juveniles were collected there on August 21.

Previous Records

Anderson (1913) stated that small numbers of Black-bellied Plovers nested in "southern" Victoria Island but gave no details. Several Victoria Island specimens collected by Captain Joseph Bernard are in the National Museum of Canada. These specimens include an adult male (July 14, 1919), and a male juvenile (September 1, 1918) collected on Taylor Island near the east coast. According to Ellis (1956), adults and young were common at Cambridge Bay in 1954. Fraser (1957) noted the species there one time only—Long Point, June 11, 1955.

Arrival and Display

A solitary male on the shore of a frozen lake near the West Arm of Cambridge Bay on June 4 was the first Black-bellied Plover noted by us in 1960. The species was next seen on June 6—a solitary male, a mile inland from the bay. A pair was noted on June 7, and several pairs on June 8. Many pairs were scattered over the tundra by June 12.

In 1962, the species was first seen on June 1—two individuals (sex uncertain) in a flock of shorebirds that flew near the frozen waters of Cambridge Bay. Calls from high-flying birds were heard occasionally during June 2–3, and the first pair noted was on high land overlooking the bay on June 5. Widely scattered pairs were seen on several days following. Many pairs favouring certain areas could be found by June 12. Calls of displaying males were among the most familiar of the tundra during mid-June. In 1966 the species was first noted on May 28 (one male).

Flight displays were first noted in the Cambridge Bay area on June 9 in 1960 and on June 8 in 1962. They continued into mid-June. Rising to a height of 75 to 100 feet or more, the male Black-bellied Plover flew about on shallow wing beats that were slow, hesitant, and maintained above the

horizontal body plane. These half strokes produced a peculiar jerky flight, sometimes referred to as the 'butterfly' flight. Lasting several minutes, it often covered several acres of ground, not necessarily confined to an area directly above the territory. During flight, the male called loudly a three-syllabled song, similar to the *tū-lī-ū* described many years ago by Anderson (*ibid.*). Drury (1961) described the song as *kehweh* or *kudiloo*. Sutton (field notes) recorded it as *whee-li-ee*.

Drury (*ibid.*) described the terminal phase of the flight display as very fast, swerving, towering, with an occasional dash towards the ground. According to our observations, the actual descent to ground was a glide, genuine enough, with wings straight out or somewhat upturned. Once on the ground the male displayed. With body low and neck stretched far forward and parallel to the ground, he ran stiffly towards the female that stood a few feet to as far as 30 yards away. At times he rushed on by her, or he stopped abruptly and stood perfectly still before her, with tail up and bill down, nearly to the ground. Occasionally attempts at copulation followed rushing. Copulation was noted as late as June 17 (1960).

Nesting

Black-bellied Plovers breeding in the Cambridge Bay area attained their greatest density from about a quarter mile to four or five miles inland from the beaches. In this low-lying tundra the pairs were scattered fairly evenly, averaging one to two pairs per square mile. Farther inland they were more widely scattered, and many seemingly suitable areas had none of these birds. They were scarce in the immediate vicinity of Mount Pelly. A few bred in low areas north of Greiner Lake.

The favoured ground was gravelly spots atop ridges and hills, not often the highest ones, or gentle slopes leading to dry peaty areas or hummocky wet tundra. The nesting site was essentially dry, stony, exposed. Golden Plovers occupied the same general habitat, but they favoured the dry peaty areas, usually of slightly lower elevations. Showing little hostility, two species occasionally bred within view of each other.

Inland on Jenny Lind Island, the Black-bellied Plovers commonly occupied the lowest gravelly, sandy, or peaty exposures adjacent to, and often surrounded by, marsh tundra. The scarcer Golden Plover nested chiefly on higher ground—well above most Black-bellied Plovers. This was the reverse of the situation at Cambridge Bay.

The exposed nesting spots of the Black-bellied Plover were also among the first snow-free areas at Cambridge Bay. Despite this advantage, the birds, for the most part, nested late. The first two nests observed in 1960, respectively on June 20 and 23, had complete clutches of eggs which were fresh or nearly so, indicating egg-laying in mid-June. The eggs of two additional sets contained very small embryos on June 25 and 26. Two sets collected by Waters on June 26 and 28 contained embryos that were possibly a week to 10 days old.

In 1962, a fresh set was found at Cambridge Bay on June 17. Egg-laying at this nest must have started by June 14, conceivably as early as June 11. Allowing 27 days for the period of incubation (Drury, *ibid.*), hatching would

have occurred not later than July 13, and considerably earlier, if incubation had started before completion of the clutch. We failed to determine when incubation actually started at a nest (*see* Supplement, p. 220).

Both sexes incubated the eggs. We were not certain which incubated the most, but it was our experience that the female was the more reluctant to go to a nest in our presence. Therefore, most nests were found by watching the male go to the eggs. Both sexes were equally solicitous of newly hatched chicks.

Incubating individuals left the nest well in advance of our approach. Once the nest was discovered, one or both parents usually returned and displayed. Of these displays we have little to add that has not already been stated by Drury (*ibid.*). However, at one Cambridge Bay nest the defending male, while running in front of us with neck stretched forward, had its tail spread wide apart and tilted high, nearly straight up. This distraction display, according to Drury, is one of low intensity and accomplished with the tail barely fanned and tilted. Nevertheless, we agree with Drury that the Black-bellied Plover closely parallels the Golden Plover in its many displays and nesting habits.

Nests of Black-bellied Plovers were scrapes in exposed spots. They were lined rather scantily with lichens, pebbles, bits of willow twigs, and leaves of various sorts. The clutch size in 13 of 14 nests at Cambridge Bay was four eggs. At one nest it may have been three, since only that number was observed up to the time of hatching. Six of seven nests observed on Jenny Lind Island in 1962 had four eggs each; one nest had five eggs, but whether all five were laid by one bird is uncertain.

Downy chicks were first observed by us in the Cambridge Bay area on July 13 (1960).¹ The same day a nest that had held four eggs on July 7 had but two young. Another sibling of older age was 10 feet from the nest; another, probably at least a day old, was not found. Egg-laying at this nest had been fairly early. Incubation may have started as early as June 15, before completion of the clutch.

A prolonged or extended hatching period of the brood at several observed nests in 1960 suggested that incubation had started before completion of the clutch. For example, a nest with three eggs and a chick on July 13 held two young 15 hours later, and three young 22 hours later. The last egg with a live chick within had not hatched at least 34 hours after hatching of the first egg.

A nest with four pipped eggs on July 14 held two eggs and one young on July 15, twenty hours later. Another young, less than 20 hours old, was several feet from the nest; this oldest sibling was missing four hours later and was not seen again. On July 16, 24 hours later, the nest held one egg, a newly hatched chick, and the second oldest sibling that was at least 28 hours old. On July 17, 19 hours later, the nest held but one chick—the youngest sibling. The three oldest siblings (banded) were not found anywhere in the immediate vicinity, although the behaviour of the adults indicated that they were not far off. These observations show that some chicks 28 hours old, or older, can be found in the nest. On the other hand, chicks less than 20 hours old may abandon the nest; we found no evidence that they ever return.

¹This intensity of the yellow down colour varied considerably, even in siblings.

Live eggs were last observed in 1962 on July 21. That day a chick hatched from one of three eggs. On August 2, 1962, Sutton and Stephens caught a small, entirely downy chick of a very late nesting. The same day they caught a large but flightless juvenile that was obviously downy about the head and neck.

Despite the fact that we banded a number of Black-bellied Plover chicks at the nest in 1960, we failed to locate one at a later date. Many adults of both sexes attended flightless young on the tundra between Cambridge Bay and Mount Pelly in early August. They were the only shore birds that were calling regularly in mid-August, and they were heard in many places.

We probably saw a young bird flying as early as August 11 in 1960, but it was not until the 16th that we definitely recorded fledged juveniles. Several miles south of Mount Pelly we encountered an adult male attending three fully fledged young. These juveniles could not be approached. They flew off erratically, followed closely by the male parent. That same day one of three flying juveniles was collected near Greiner Lake. An adult male was very solicitous of these young. An adult female displayed close by, but we failed to determine if she was the mate. Adults sometimes gathered in common defence of young. Unattended juveniles were first noted that year on August 19—three together, inland.

Flying juveniles were first recorded in 1962 on August 16. Of three unattended individuals that fed together on the tundra near the outer beaches of Cambridge Bay, the one collected by Sutton was not full-winged, and down clung to the plumage of its forehead, face, and tibial area. As in 1960, this species was the only shore bird that showed signs of being alarmed over young in mid-August.

Departure

Although not so abundant as earlier, adults of both sexes were still common in the Cambridge Bay area in 1960 as late as August 16. Their numbers fell off abruptly thereafter, and none was observed after August 20 (one bird, Anderson Bay). Adults did not gather at the beaches. Unattended juveniles were first noted at the beaches that year on August 20 (one bird, Anderson Bay). In the Cambridge Bay area, a lone juvenile was seen inland as late as August 24, and a flock of three juveniles at the beach as late as August 25.

In 1962, adults were last recorded on August 13, when four widely separated individuals were seen inland. None was observed at the beaches. Flying juveniles were seen near, but not at, the beach as early as August 16. Many were seen by Sutton and Stephens inland between Cambridge Bay and Mount Pelly during August 21–25. In the partly frozen mud of ponds near the settlement of Cambridge Bay, Sutton saw two together, and a solitary individual, feeding on September 9—our only record for that month.

Banding

One adult female Black-bellied Plover was banded and colour-banded (yellow) near its nest at Cambridge Bay on July 14, 1960.

The following downy chicks were banded in or near the nest at Cambridge

Bay in 1960: three siblings on July 13; three siblings, one on July 13 and two on July 14; three siblings, two on July 15 and one on July 16; one individual on July 19.

Specimens

Seven adult male Black-bellied Plovers were collected: four at Cambridge Bay in 1960 respectively on July 21, 23, 31, and August 6; two at Cambridge Bay in 1962 respectively on June 5 and July 23; one on Jenny Lind Island on June 26, 1962. Weights (gm) and measurements (mm) of the seven: weight 160 to 217 (av. 188.71), wing chord 181 to 194 (185.85), flattened wing 186 to 199 (191.0), tail 73.0 to 79.0 (75.28), exposed culmen 27.0 to 30.0 (28.14), tarsus 44.0 to 49.0 (46.42). Specimens taken late in the season showed considerable greyness of plumage.

Two fledged male juveniles (weight 186 to 193, wing chord 180 each) were unattended when collected at the beach of Anderson Bay on August 21, 1960. Down was detectable but not conspicuous.

Three fledged female juveniles were collected at Cambridge Bay: one (weight 174, wing chord 159) inland on August 16, 1960; two (weight 161 to 166, wing chord 171 each) near the beach in 1962 respectively on August 16 and 22. Colours of soft parts of 1962 specimens: bill black, legs and feet dark olive grey. Down was conspicuous on all three specimens, especially at base of bill, throat, thighs, and rump.

Four downy chicks were collected at Cambridge Bay: one male (weight 24.0, exposed culmen 13.5, tarsus 33.0) at the nest on July 19, 1960; one female (weight 23.0, exposed culmen 11.5, tarsus 32.0) at the nest on July 17, 1960; one female (exposed culmen 11.5, tarsus 32.0) from an egg taken in 1960 on July 17 and preserved when one hour old following hatching on July 18; one of uncertain sex at the nest on July 22, 1962. Sutton made a painting of the latter chick directly from life.

One pipped egg was collected at Cambridge Bay on July 15 and preserved in alcohol.

Eight egg sets, each with nesting material, were collected: three with four eggs each at Cambridge Bay in 1960 respectively on June 20, 23, 25; one with four eggs at Cambridge Bay in 1962 on June 17; three with four eggs each on Jenny Lind Island in 1962 respectively on June 23, 26, and July 1; one with five eggs on Jenny Lind Island on June 23, 1962. The 33 eggs measure: length 47.0 to 56.5 (51.37), width 34.0 to 36.7 (35.33). The ground colour of the fresh shells often had a slightly greenish cast, not observed by us in Golden Plover eggs. The eggs collected on June 25 were extraordinarily greenish; however, the green has largely faded since preparation. Drury (*ibid.*) observed a greenish tint to the ground colour of Golden Plover eggs in contrast to the pastel grey of Black-bellied Plover eggs.

Annual Breeding Cycle

Black-bellied Plovers return to southeastern Victoria Island and adjacent small islands in late May or in early June. Some of the first seen are solitary males. Pairs may form by June 5, and within a week many are established on territories. Flight displays are conspicuous from about June 8 and probably

reach a peak in activity some time in mid-June. The favoured nesting grounds are exposed, dry tundra areas of fairly low elevation, within five miles of the marine beaches. Widely scattered pairs breed farther inland. Egg-laying starts in mid-June and continues into late June, occurring exceptionally in early July. The clutch size is four eggs, probably three eggs occasionally. Five-egg clutches are exceptional. Eggs are laid at one- to two-day intervals. Incubation probably starts before completion of the clutch in most cases. The period of incubation is probably close to 27 days. Both sexes incubate eggs early and late in the period. Hatching commences in mid-July and continues into late July, exceptionally later. The hatching period of the brood is often 24 to 48 hours, occasionally less than 16 hours. Some young abandon the nest before they are 20 hours old; these young may leave the nest before the last eggs hatch. Adults of both sexes are solicitous in the care of young in the nest, but little is known of their care of older young, or of the length of the fledging period. Males attend young until after the fledging. Their calls are heard in many places in mid-August when many young start to fly. Following the fledging, adults suddenly abandon the nesting grounds. They leave the region without first lingering at the marine beaches. Many at this time show grey feathers. Unattended juveniles occur as early as August 16, probably earlier. They appear to be as common inland as at the marine beaches until August 24 or 25 when they become scarce everywhere. September 9 is our latest date for the species and probably is exceptional.

***Arenaria interpres* (Linnaeus) Ruddy Turnstone**

The new-world Ruddy Turnstone (*Arenaria interpres morinella*) breeds commonly in the Cambridge Bay area and probably throughout much of southeastern Victoria Island. It breeds commonly on Jenny Lind Island also.

Previous Records

A number of Ruddy Turnstone specimens, including adults, juveniles, and eggs, collected on Victoria Island by Captain Joseph Bernard are in the National Museum of Canada. Some of these specimens were collected during 1913-15, but the localities are vague. Bernard (1925) stated that a few turnstones bred on Taylor Island during the climatically backward season of 1918, when a few nests were found early in August; large numbers bred there during the warm season of 1919. Ellis (1956) stated that adults with flying juveniles were common near Cambridge Bay during August of 1954.

Arrival

Although we neglected to look for early arriving Ruddy Turnstones at the Cambridge Bay beaches in 1960, some of them probably flocked there before moving inland. A few of these birds were already paired when the species was first observed on June 3 that year, but pairs were not common inland before June 9.

We were especially watchful for early arrivals in 1962. The first turnstone seen, a solitary male (collected), stood on snow that covered the lower

coastal slopes of Cambridge Bay on May 30. Of two collected together on the bay ice the following day, both were males. Two widely separated individuals were heard near the bay on June 1, but none was noted on the 2nd. A solitary male with Golden Plovers was the only one observed on the fast-thawing coastal slopes adjacent to the Augustus Hills during June 2-3.

Ruddy Turnstones were common at the Cambridge Bay beach on June 4. A mixed flock of nearly 50 birds fed and roosted in a dump area just up from the beach. The size of the flock fluctuated during several days following, but 20 to 30 turnstones were there almost any time. A change in attitude of certain individuals, particularly males, was evident on June 8. While standing on snow or exposed rocks, these birds crouched, vibrated their tails, and uttered metallic clicking noises. They dashed at one another and behaved much like old-world turnstones at the beaches of Ellesmere Island (Parmelee and MacDonald, 1960). Males occasionally lifted their wings high. According to Bergman (1946), copulation readiness of the male turnstone is manifest when the wings are extended straight upwards for one to five seconds.

A sudden exodus by the majority of this flock took place during June 8-9. Only a few birds remained to display, the last leaving for the breeding areas inland on June 10. The species was not common at the beaches again until the juveniles appeared.

Three turnstones were noted as early as May 28 in 1966.

Nesting

Ruddy Turnstones breeding in the Cambridge Bay area and on Jenny Lind Island inhabited both dry and wet tundra areas that were close to, or remote from, marine beaches. They favoured dry peaty slopes with a moderate vegetative cover that bordered hummocky wet tundra or lake fronts. Less often they inhabited the higher, more barren slopes but avoided the truly wind-swept ridges. None was noted on the highest ridges where Knots and a few other species resided.¹

Pairs were not evenly distributed. Some pairs definitely were solitary, but others bred fairly close to one another in rather restricted areas of comparatively few acres. These little groups, each containing three or four pairs on the average, were scattered here and there. In traversing many miles of tundra, one regularly encountered these island populations, but only having first passed through extensive areas completely devoid of these birds. Distribution of this sort was not unique with turnstones. A good many species were similarly distributed. It was obvious in turnstones because they were especially conspicuous.

Egg-laying at Cambridge Bay in 1960 may have culminated in mid-June. A nest with three eggs on June 14 had four eggs on the 15th. Another held four eggs that were fresh or nearly so on June 16; another on June 25 held eggs containing embryos probably not more than four or five days old. On the other hand, on June 19, Waters collected a set that may have been incubated for a week to ten days, judging from the size of the embryos. In 1962 on

¹The close association between old-world races of Ruddy Turnstone and Knots that breed on Ellesmere Island was not observed in the present study.

Jenny Lind Island, the eggs of four sets collected during June 22–25 contained very small embryos, indicating egg-laying in mid-June also.

Nests were exposed shallow depressions in peat or in flat vegetation, lined with lichens, dry leaves, and bits of various plants. The clutch size of nine nests at Cambridge Bay, and of eight nests on Jenny Lind Island, was invariably four eggs. Two nests on Jenny Lind Island were only 32 paces apart, not separated by any sort of ridge.

Both sexes incubated early and late in the period, but the female at one Cambridge Bay nest was on the eggs more than the male. The period of incubation, from laying to hatching of the last egg, was ascertained to be 21 days and 23 hours (error not greater than 11 hours) at this nest.

Warned by the mate, the incubating turnstone almost invariably left the nest well in advance of our approach, and it was reluctant to return to the eggs. The incessant cries and flashing colours were distracting, but normally the birds did not scuttle along the ground ahead of us in sandpiper fashion. However, one male turnstone, somewhat accustomed to our frequent visits, leaped off the eggs directly in front of us. Crouched, and with body and head feathers puffed out, wings held in close, tail spread down, it uttered low clicking noises as it scuttled along. Another, noted by Sutton, feigned injury by flapping, spreading, and dragging its wings in typical plover fashion.

Returning to the nest, the male, and also the female, often walked to within a few feet of the site and suddenly left the ground and fluttered down on the eggs—a peculiar behaviour also characteristic of old-world turnstones breeding on Ellesmere Island.

Hatching at Cambridge Bay started in early July. A nest with four pipped eggs on July 5 held three young and an egg 19 hours later on July 6. Actually, the oldest sibling was not in the nest then, nor was it very close by; however, several hours later it was back in the nest. The last egg laid (marked) hatched last, on July 6, at least 12 hours after the first three siblings had hatched. On July 7, 12 hours later, the nest was empty, but only five feet away the youngest sibling was brooded by the male parent. The oldest three siblings presumably were off with the female. The family moved to a new area a quarter mile away where the female parent remained until July 21. The male parent (colour banded) and at least two young remained there until July 27—about the time some turnstones fledged that year.

Live eggs were noted in nests at Cambridge Bay as late as July 9 in 1960, and as late as July 11 in 1962. We found no evidence of a really late nesting.

Flying juveniles were first noted at Cambridge Bay in 1960 on July 28. On the tundra, from one to two miles inland, the following were noted that day: flock of four (two collected) unattended; one (collected) unattended; two (one collected) attended by male parent; two attended by male parent. By July 31, flying juveniles could be found in many places. Many of them were unattended.

Two fledged juveniles (one collected), attended by the male parent, were noted inland from Cambridge Bay as early as July 24 in 1962. These juveniles were from an early nesting. Conceivably, they could have been from eggs laid before June 10.

According to Bergman (*ibid.*), the male and female parents divide the task of rearing young following hatching, but the part played by the female

becomes increasingly less; after the juveniles have their plumage, the adult females leave the breeding areas in Finland from the middle to the end of July, followed by the males which depart, as a rule, at the beginning of August. This is nearly the situation on Ellesmere and Victoria islands in Canada.

Departure

Following the fledging of their young in late July of 1960 and 1962, many adult turnstones suddenly left the Cambridge Bay area without stopping at the marine beaches. Those few adults that frequented the beaches in July did not flock there. An odd female collected August 6 was the only adult seen at the beach that month.

The few adults that remained in the breeding areas in early August accommodated young that fledged late. These adults were mostly, if not exclusively, males. One (collected) attended a recently fledged juvenile on August 10 in 1960. In 1962, a few adults attended young on August 2, but none was seen thereafter. Captain Joseph Bernard collected an adult male (specimen in National Museum of Canada) with young on Victoria Island as late as August 15 in 1913.

Some juveniles remained inland after the adults had departed. They were last seen there in 1960 on August 16 (one bird) and in 1962 on August 13 (five birds). Most flying juveniles went to the beaches early. They were first noted at the Cambridge Bay beaches in 1960 on July 28 (two birds) and in 1962 on July 31 (one bird). Their numbers increased there and by mid-August they were among the commonest of the beach birds. Nine that fed together on the outer beaches of Cambridge Bay on August 16, 1962, formed the largest flock noted.

Juvenile turnstones were scarce along the coast in late August. In 1960, a few occupied the beaches of Anderson Bay during August 20-21 and of Wellington Bay during August 26-28. Two juveniles together at the beach of Cambridge Bay on August 30 were the last recorded. None was seen at the beach in 1962 after August 21 (one bird).

Feeding Behaviour of 15-Day-Old Chick

A Ruddy Turnstone juvenile that had been banded shortly following its hatching at Cambridge Bay on July 6, 1960, was caught by hand a quarter mile from its abandoned nest on July 21, when 15 days old. The male parent (colour banded) was attending it and at least one other sibling, which we failed to catch. The female parent, a hundred yards off at the time, flew in during the disturbance.

The 15-day-old chick (weight 56.0, wing chord 101, tail 22.0, exposed culmen 19.0, tarsus 32.0) was kept in a box. We attempted to feed it several kinds of food including live insects, but it refused each offering. Invariably this bird flipped a small tin container filled with water and placed in the box for its use. The first time food was put beneath the tin container the chick ate. After finding the food beneath the container the chick did not hesitate to eat a variety of items. For several days it thrived on moistened loon flesh, cut into pieces the size of small caterpillars.

On July 24 the chick was released where it had been captured earlier. Not quite fledged it ran off with the male parent that still attended young. The 18-day-old chick (weight 68.0, wing chord 110, tail 33.0, exposed culmen 19.5, tarsus 33.0) had well-developed feathers of the head, back, scapular, pectoral, and side regions; its rectrices, remiges, and upper wing coverts were partly sheathed; its under wing coverts were almost entirely sheathed; down was still conspicuous at base of bill, neck, rump, and on pectoral, belly, and leg regions.

Although we failed to find the chick again, the male parent defended the area until July 27. The female had not been there since the 21st.

Banding

The following Ruddy Turnstones were banded near Cambridge Bay in 1960: three siblings and their male parent (552-93504 and yellow colour band) at the nest on July 6; another sibling at the nest on July 7; two siblings at a nest respectively on July 7 and 8; a nearly fledged juvenile on July 28.

An adult male was banded near the beach of Cambridge Bay on June 4, 1962.

Ruddy Turnstone 552-93504, readily identified by its yellow colour band, defended its 1960 territory on June 9, 1962. It flew about with its mate, invariably returning to the old nesting ground; evidently the eggs had not yet been laid. We did not have an opportunity to visit the site again.

Specimens

Sixteen adult males were collected: nine at Cambridge Bay in 1960 during June 16 to August 10; five at Cambridge Bay in 1962 during May 30 to July 24; two on Jenny Lind Island during June 21-22. Weights (gm) and measurements (mm) of the 16: weight 85.5 to 135 (av. of 14 birds 105.89), wing chord 138 to 151 (144.5), tail 56.0 to 62.0 (58.93), exposed culmen 20.5 to 24.0 (22.1), tarsus 25.5 to 28.0 (av. of 15 birds 26.62).

Ten adult females were collected: seven at Cambridge Bay in 1960 during June 13 to August 6; three on Jenny Lind Island in 1962 during June 21-22. Weights and measurements of the ten: weight 77.0 to 128 (av. of eight birds 109.37), wing chord 145 to 153 (148.5), tail 60.0 to 64.5 (62.0), exposed culmen 21.5 to 24.5 (22.85), tarsus 26.0 to 28.5 (26.75).

Specimens of both sexes collected in late June showed traces of moult in the neck region. The moult (head and body areas) was more advanced in specimens collected in late July. A female collected August 6 showed the most extensive moult of the series; a male collected August 10 was no more advanced in its moult than were several males that had been collected in late July. The flight feathers of all late specimens were not badly frayed and therefore were included in the measurements.

Cambridge Bay and Jenny Lind Island specimens are referable to the race *morinella* not only because of their small size but also because of their bright plumage. When compared with a series of *interpres* from Ellesmere Island, it

is apparent that the upper parts of these birds are brighter, i.e., the cinnamon-rufous areas are more extensive. The pronounced whiteness of their heads, particularly the napes, is most obvious, however.

Nine recently fledged juveniles were collected at Cambridge Bay: four males during July 28 to August 1 in 1960; one male on July 24, 1962; three females during July 28 to August 9 in 1960; one of uncertain sex on August 9, 1960. These juveniles were probably local birds since all were collected inland, some in the presence of attending adults. Except for one extraordinarily pale individual, the plumage of these birds was darker than expected. These juveniles appear to be as dark as comparable Ellesmere Island juveniles.

One very large downy female (weight 37.0, wing chord 53.0) was collected at Cambridge Bay on July 17, 1960. Feathers were conspicuous only on its back and sides. Its legs and feet were dull orange, somewhat dusky at the joints. One fairly small downy female (weight 23.0) was collected at Cambridge Bay on July 11, 1960. Wing quills were barely visible.

Four newly hatched downies were collected at Cambridge Bay: two males (weight of one 11.0, exposed culmen 9.0 to 9.5, tarsus 20.5 to 21.5) on July 11, 1962; two females (weight 10.0 to 10.5, exposed culmen 10.0 to 10.5, tarsus 20.5 each) on July 8 and 9 in 1960, respectively. Sutton painted one of the male chicks directly from life.

One pipped egg was collected at Cambridge Bay on July 9, 1960, and preserved in alcohol.

Six sets of four eggs each, with nest linings, were collected: two near Cambridge Bay in 1960 respectively on June 16 and 25; four on Jenny Lind Island in 1962 respectively on June 22, 22, 23, 25. The 24 eggs measure: length 39.0 to 43.1 (41.17), width 27.2 to 29.8 (28.65).

Annual Breeding Cycle

Ruddy Turnstones return to southeastern Victoria Island during the last days of May. The first few birds seen are males on the sea ice and adjacent snow-covered slopes. Mixed flocks are common near the seashore by June 4. They feed there for several days before the males display. The exodus to the breeding grounds near by is sudden, and many pairs become established by June 10. The favoured nesting ground is low-lying, essentially dry tundra, near lakes or wet areas, near the beaches or well inland. A few turnstones that pair early possibly may lay eggs before June 10. Most eggs are probably laid during June 10-20. The clutch size is four. Incubation probably starts some time between the laying of the third and fourth eggs. The period of incubation is 21 to 22 days. The male incubates the eggs less often than the female but is more solicitous of the young from hatching to fledging. Young start to hatch by July 5 or earlier; some hatch as late as July 11. The hatching period of the brood is rapid and may be less than a day. Young may leave the nest within 12 hours of hatching but may later return to be brooded with younger siblings. Pairs with chicks may remain within a quarter mile of the original territory during the period of fledging. Young, 15 days old, recognize food only after first discovering it beneath objects, which they flip after the manner of adults. Eighteen-day-old young

are not quite fledged. Young from very early nestings fledge as early as July 24. Many young fledge during the last days of July and early August when adults become scarce. The few adults attending fledged young in mid-August are males. Unattended juveniles go to the beaches early; they flock there during July 28 to August 30. Some 23-day-old young are fully fledged on the marine beaches of Jenny Lind Island. The annual breeding cycle for the species on Jenny Lind Island appears to be similar to that of Cambridge Bay (*see* Supplement, p. 221).

Numenius phaeopus (Linnaeus) Whimbrel

A single bird, tentatively identified by us as a Whimbrel, was seen flying along the eastern shore of Cambridge Bay north of Cape Colborne on August 13, 1960. No Whimbrels were seen by us in 1962. On Jenny Lind Island in 1966 the species was positively identified by three observers at various times: two birds calling loudly and flying together inland on July 12 (Parmelee); two flying together near the coast, and later the same day two flying together inland on July 20 (Sutton); three flying together inland on July 25 (Graul). It was assumed that these birds were non-breeding accidentals.

Calidris canutus (Linnaeus) Knot

The new-world Knot (*Calidris canutus rufa*) appears to be an uncommon and highly local bird in southeastern Victoria Island. In the Cambridge Bay area a few pairs breed sporadically on the very top of Mount Pelly. They are less confined and somewhat more abundant on Jenny Lind Island.

Previous Records

In the National Museum of Canada there are several adult and juvenile specimens of Knots collected in 1919 by Captain Joseph Bernard in far eastern Victoria Island and adjacent Taylor Island. These include: adult male (De Haven Point, July 18); adult male with four small downies (Taylor Island, August 4); adult female (Taylor Island, July 15); three feathered, unfledged juveniles (Taylor Island, August 2-10). According to Taverner (1927), Knot eggs were collected by Bernard on Taylor Island in 1919, but precisely when they were collected is not known to us. Bernard (1925) stated that he found six Knot nests there that year.

Courtship

Two male Knots independently performed display flights from the summit of Mount Pelly on June 8, 1960. Rising rapidly they entered a fog bank that hung low above the mountain for hours that day. Completely enveloped and hidden by the grey mist, they sang their mating calls from what seemed to be a hundred feet above our heads. At times both birds were up in the fog singing simultaneously. Flight songs were noted there on June 16 and 18 also. We failed to note the species on Mount Pelly in 1962.

The mating call, a clear *poor-me* with the emphasis either on the 'poor' or the 'me,' was heard fairly frequently on Jenny Lind Island in 1962. Another call of uncertain function, a rapidly repeated *whip-poo-me*, was also heard. On the higher slopes of the island, during June 20-22, we watched a half dozen males performing flight songs. With rapidly vibrating wings held horizontally, the displaying bird hovered and sang from 150 to 300 or more feet above the rocky slopes. Between songs he continued flying. His display often covered a large area—fully a quarter to more than a half mile in diameter. On set wings held close to the body, he dove earthward in a series of vertical plunges, alighting near or far from the place he had been a few minutes before. The performance was high, rangy, prolonged, wholly unpredictable.

The birds also raced about. Appearing suddenly from low over the slopes, they flew swiftly from sight. Almost certainly some were incubating eggs. This would account for the long periods of silence when they were neither seen nor heard. Four males shot during June 20-25 had enlarged gonads and well-defined brood patches.

Nesting

The only place Knots were noted in the Cambridge Bay area was on the very top of Mount Pelly (two, possibly three pairs in 1960). There the aspect was most severe, the summit having been swept almost continuously by the polar winds. Whether they ever nest on Mount Lady Pelly or other high ridges in the region is not known.

Several species of birds resided on the more protected slopes of Mount Pelly, but the Horned Lark was the only one other than the Knot that was at home up on top. At this very point a typically high-arctic species and a typically low-arctic species bred.

Much of southeastern Victoria Island lacked the habitat preferred by Knots. In this sense the summit of Mount Pelly was virtually a little spot of high-arctic habitat within the Low Arctic.

Jenny Lind Island more closely approached the high-arctic condition and appeared better suited to Knots. But even there the birds were not common. The total number of pairs in the eastern third of the island probably did not greatly exceed a dozen pairs, and most of them appeared to be concentrated on the stony heights overlooking marshy and sandy plains. A few widely scattered pairs were in the lower areas, not necessarily near the beach, although Knots occasionally fed there (*see* Supplement, p. 221).

The only clue to a nest was found far from the sea in a sandy area of low elevation near some sedgy ponds. There, on June 24, a Knot, with its feathers puffed up and tail spread, suddenly feigned injury—a sight witnessed by us many times on Ellesmere Island. No doubt this individual had eggs close by, but we failed to find them in the short time we were there.

This wide latitude of habitat, from comparatively well-vegetated lowlands to the higher stony ridges, was also the Knot's choice on Ellesmere Island. There the species commonly but not invariably nested in muddy, well-vegetated, hummocky tundra. However, the well-vegetated areas of southeastern Victoria Island were lush by comparison.

Specimens

Four adult male Knots [weight 124 to 134 gm (av. 129.5), wing chord 160 to 163 mm (161.75), tail 60.0 to 65.0 (62.62), exposed culmen 31.5 to 35.0 (33.5), tarsus 30.0 to 32.5 (31.62)] were collected on Jenny Lind Island during June 20–25 in 1962. All four were in breeding condition.

Although similar in size to Ellesmere Island birds (*Calidris canutus canutus*), the rufous underparts of the Jenny Lind Island specimens do not extend so far down the abdomen. These somewhat paler birds are referable to *Calidris canutus rufa*.

Calidris bairdii (Coues) Baird's Sandpiper

Baird's Sandpiper is the commonest scolopacid in the Cambridge Bay area where it breeds on dry tundra from beside the beach to the upper slopes of Mount Pelly. Its status elsewhere in southeastern Victoria Island is little known.

Two juveniles (one collected) were noted near the beach of Wellington Bay on August 26, 1960.

On Jenny Lind Island the species was uncommon in 1962. Relatively few were noted during June 19–July 5, chiefly on stony ridges near the coast. Two males with brood patches collected there on June 30 and July 2, respectively, probably were breeding birds. The species bred commonly on Jenny Lind Island in 1966 (see Supplement, p. 222).

Previous Records

One egg (in British Museum) of Baird's Sandpiper was collected at Cambridge Bay in 1853 by members of H.M.S. *Enterprise* (Oates, 1902). Several specimens from western parts of Victoria Island are in the National Museum of Canada, but records from eastern parts are scarce. Apparently Captain Joseph Bernard collected specimens in the De Haven Point–Taylor Island area. Ellis (1956) reported small flocks at Cambridge Bay during August of 1954.

Arrival

Baird's Sandpiper was first noted at Cambridge Bay in 1960 on June 2 (one bird inland). This species, which was largely overlooked by us in the beginning, was recorded next on June 5 (one bird inland).

In 1962, several Baird's Sandpipers were observed June 2 on the coastal slopes of the Augustus Hills. Many singles, twosomes, and small flocks were in open areas on the sides and tops of the hills the following day. Flight singing was already evident. The population that resided at Cambridge Bay had arrived in force by June 4. Not only aerial displays were evident but also erratic flights or chases by two or more individuals. The collecting of two birds that chased about together on June 7 provided a male and female.

The newly arrived birds were not confined strictly to dry tundra. Even displaying males were noted in fast-thawing wet tundra areas. But the large majority soon settled on the drier slopes and ridges that were everywhere



June 28, 1960. Incubating Baird's Sandpiper in well-vegetated dry tundra inland from Cambridge Bay. Young of this abundant species commenced hatching in late June.

conspicuous in the Cambridge Bay area. These dry spots were often the first snow-free places, affording the species an opportunity for early nesting. Copulation was noted as early as June 7. Egg-laying was also early (see Nesting below).

A flock of eight newly arrived Baird's Sandpipers alighted on an exposed ridge near the upper end of Cambridge Bay on May 28, 1966. Numerous males displayed there the following day.

Aerial Display

Aerial display by male Baird's Sandpipers at Cambridge Bay attained a peak in activity during the week following arrival. It subsided in mid-June and virtually ended by late June. During the height of activity these birds performed throughout the day and evening, as late as 10:00 P.M. So concentrated were they in certain areas that it was not uncommon to see several males displaying at once over an acre of ground. Many of the early territories were not only exceedingly small but also indefinable. The birds later dispersed or fanned out at the onset of egg-laying when much of the high ground was exposed. The density was then estimated at 20 to 25 pairs per 100 acres of suitable habitat.

The displaying male commonly rose from the ground at a 45-degree angle, usually to a height of 30 to 60 feet, singing a frog-like trill¹ during the last few feet of the ascent. Crescendo occurred during the descent that followed. The downward glide all the way to earth was accompanied by a setting of the outstretched wings high above the back. Often the male did not descend immediately following the ascent but remained aloft for two or three minutes. There he circled, trilling as he went, occasionally stopping at various heights to tread in one spot. He also sang entirely different flight notes that closely resembled the *cree* flight note of the Stilt Sandpiper. We recorded these notes as *cree* for the Baird's Sandpiper also, but noted that they were higher pitched and not nearly so far-carrying. These *cree* notes are likely the *dree* notes of Drury (1961).

Of three Baird's Sandpipers that were chasing about together low over the tundra on June 7, 1962, one broke loose from the trio and climbed to a height of 150 feet or more, repeating the *cree* notes as it flew about. For several minutes the bird moved rapidly, ascending, descending, and ascending again, occasionally treading. We collected it—a male with enlarged gonads—when it approached the ground. Display flights above 100 feet were noted several times on days following. Despite the high flying, Baird's Sandpiper did not range very far. That is to say, it did not cover much ground during display, differing in this respect from the Knot and Stilt Sandpiper.

Nesting

Baird's Sandpipers inhabited the dry ridges in the Cambridge Bay area. They were especially common on ridges overlooking the bay and could be found throughout the disturbed areas. They were familiar birds of the village, nesting close to well-travelled roads and occupied houses and other

¹This call is difficult to describe. We can do no better than Drury (1961) who described it as *drdrdr zzzzzzzzzzzzzz*.

buildings. The species was also especially abundant on the barren ridges and slopes below and on the sides of Mount Pelly. None was found nesting atop the summit, but a single male performed aerial displays there on June 5. As with other species, Baird's Sandpipers were not found in all suitable habitats in the Cambridge Bay area, but they were observed in so many places that they were considered truly abundant.

Nests were found in two types of terrain. One was stony, barren ground with meagre plant growth, usually on wind-swept ridges. A nest situated on a steep bank in sheer rock only 30 feet from the bay waters was an extreme situation, as was a nest on a gravelly, nearly plant-free terrace high on the side of Mount Pelly. Included here were the artificial sites in disturbed areas where the ground was torn up through construction.

A commoner type was relatively dry slopes with spotty to fairly dense vegetation (principally *Cetraria*, *Evernia*, *Thamnolia*, *Saxifraga*, *Oxytropis*, *Dryas*, *Astragalus*, *Poa*, *Carex*, *Salix*) that often led down to wet tundra or the bank of a pond or lake. The only nest observed over wet ground was in a grassy hummock. This atypical nest was also unusual in that it was well concealed and lined chiefly with willow leaves. It closely resembled nests of White-rumped and Semipalmated sandpipers.

Most nests were shallow depressions in bare ground or in a mat of vegetation. They were lined chiefly with lichens and bits of other plants. A nest found by Waters was lined with grasses. These nests were fully as exposed as those of plovers and turnstones occupying the same habitat. We found one nest simply by spotting the eggs while walking close to the site when both parent birds were away.

Although nests were not found before June 15 in 1960, it may be assumed that incubation at some nests started much earlier, because some young hatched as early as June 29. Allowing 21 days for the incubation period (Drury, *ibid.*), incubation must have started as early as June 8, egg-laying having taken place during the previous week. Judging by the size of embryos in collected eggs, and by the hatching time of young, most clutches were completed in mid-June. Slightly incubated eggs in one nest on June 27 and pipped eggs in another on July 15 indicated egg-laying after June 20 in some cases.

In 1962, also, most clutches were probably completed in mid-June. A nest with three eggs on June 11 had four on the 12th. One with three eggs on June 12th had four on the 13th. Another with three eggs on June 15 had four on the 16th. Eggs of four complete clutches collected during June 14-15 were fresh or nearly so; those of four clutches collected during June 16-19 contained embryos that were less than four days old.

Both sexes shared the duties of incubation throughout the period. Early in incubation we caught each bird of a pair in turn on the eggs by dropping an enclosure over the nest. An individual shot at another nest proved to be a male; one shot at another proved to be a female. Both birds (one banded) of still another nest incubated pipped eggs and brooded newly hatched young.

Of thirty completed clutches observed in the Cambridge Bay area, each contained four eggs. We found no exception to the four-egg clutch.

At three nests we marked the last (fourth) egg laid, respectively on June 12, 13, and 16. Unfortunately, we did not return to Cambridge Bay until

July 5, at which time all three nests were empty except for an egg that failed to hatch in one nest (clutch completed June 13). Allowing 21 days for the incubation period, young at these nests would have hatched on July 3, 4, and 7, respectively. From these observations we conclude that three eggs of one nest hatched in less than a 22-day period, since a predator likely would not have left an egg in the nest. On the other hand, the eggs of one nest must have been destroyed, unless the period of incubation was less than 20 days.

Baird's Sandpiper usually left the nest in advance of our approach, and none flushed directly underfoot. This was typical of other species nesting under exposed conditions of the dry tundra. The incubating bird in leaving the nest ran before us with feathers puffed out, tail spread downward, wings dragging but not stretched out. It cried as it went, the notes resembling *too-ee, too-ee*, or *tui, tui*.¹ Banded individuals led us far from the eggs, keeping up the pretense a half mile or more from the nest at times. In this behaviour Baird's Sandpiper closely resembled the Knot.

When we sat quietly near a nest, the displaced bird usually returned to the eggs within minutes. Nests, therefore, were easy to find. Some individuals allowed us to sit quietly within a foot of the nest. On one occasion we reached out and picked the incubating bird off the eggs. Nevertheless, every quick movement on our part triggered the distraction display, and the bird could be made to repeat the display indefinitely. One displaced bird suddenly left the ground and fluttered in mid-air before our faces (*see* White-rumped Sandpiper below). Behaviour of this sort was noted by Drury (*ibid.*).

During the height of incubation, the plumage of both sexes was often worn. This was especially true of feathers of the pectoral region, which lost the distinct buffiness characteristic of the species. Baird's Sandpiper in its worn plumage looked strikingly like the Semipalmated Sandpiper, and we readily confused the two species in the field until the habitat, behaviour, and calls of each were better understood.

Hatching of young started in late June. The peak in 1960 and 1962, however, did not occur until some time during the first week in July.

Young Baird's Sandpipers left the nest within a day of hatching. A nest with four pipped eggs at 9:30 A.M. on June 29, held two eggs and two young (one wet) at 11:45 P.M. By 8:00 A.M. June 30, there were four young in the nest. The oldest (banded) ran when we approached the nest; the second oldest (banded) ran when the edge of the nest was touched; the third oldest ran when touched; the youngest (collected) was still wet and did not attempt to run. Both parents (one banded) attended the brood; the more solicitous parent was thought to be a male.

A nest with four pipped eggs on June 28 was empty 27 hours later the following day. The four chicks were found together 120 feet from the nest. Of the two parents that attended them, the one (banded) believed to be a female was the most solicitous. By July 1, both adults and young had moved some 300 yards down slope where they remained in hummocky wet tundra. The family was observed there on July 1, 3, 5, 6, 7, after which time they disappeared.

¹These notes were hardly distinguishable from the distress calls of the Stilt Sandpiper.

A nest with three pipped eggs (one collected) and a newly hatched young at 11:00 A.M. on July 6, contained two young and an egg at 2:00 P.M. Both adult birds (one banded) attended this nest. The two young were banded and the leg of the unhatched one was carefully drawn through a small hole in the shell and banded. Presumably this young hatched and left the nest (empty when checked later) successfully. Its banded sibling, fully fledged and *unattended*, was collected at the Cambridge Bay beach about two miles from the abandoned nest on July 26, when 20 days old. Therefore, Baird's Sandpiper may fledge within three weeks of hatching. Since this particular individual was not well developed (*see* Specimens below), it probably was newly fledged, indicating that the parent-offspring bond dissolved soon after fledging. The collecting of attended young with a more advanced juvenal plumage indicates, however, that young may be attended after 20 days of age. Attending adults are not necessarily parent birds (*see* Supplement, p. 222).

Adult Baird's Sandpipers, many attending young, were especially conspicuous during early and mid-July. These birds, calling *too-ee, too-ee*, ran before us in many places. A common single note at this time was recorded as *preeett*; this alarm note, given in the presence of young, is very close to the "*drrrr-eeeet*" of Drury (*ibid.*). An alarm note, given by incubating birds, was similar. We recorded it as a single loud *shreeeee* or *shreeett*.

In areas of heavy concentration, Baird's Sandpipers gathered whenever any one pair was disturbed. Four nests were, for example, less than 200 yards apart from one another; two others were only 120 paces apart. Although we found no pooling of young following hatching, the pairs were often confused. It was difficult to determine which birds were really attending chicks and which ones had merely been attracted to the scene. By observing isolated pairs and marking individuals we were certain that both adults attended chicks for at least a week following hatching. Our data do not support any hypothesis beyond that time. At best we can say that some males (one collected by Sutton, July 23, 1962) attended fledged young.

In 1960, fledged young were first noted on July 21 (one collected inland, unattended by adults). They were first observed in 1962 on July 23 (three collected inland, at least one attended).

Departure

A company of six Baird's Sandpipers on the beach of Jenny Lind Island on June 28 was the first sign of a post-breeding migratory movement of adults. Presumably these birds had failed in nesting; perhaps they had not nested at all. Adults were still common in the Cambridge Bay area until July 20 but soon became scarce. They were last noted in 1960 on July 24, in 1962 on July 26. All were inland and attending young, some of which were fledged.

Unattended juveniles were abundant in the Cambridge Bay area in late July. They occurred both inland and at the beaches, commonly along the rocky shore of the stream that flowed from Greiner Lake to the bay. In 1960, large numbers of them were strung out along this stream as late as July 31, but by the following day they had virtually disappeared. None was seen anywhere until August 10, when a single bird fed near the stream. A

flock of four juveniles was noted on dry tundra a quarter mile inland on August 14. A flock of three was noted at the Greiner stream on August 15—our latest date for the species at Cambridge Bay that year.

The following juveniles were recorded in the Cambridge Bay area during August in 1962: scattered singles and twosomes near the bay on the 1st; a few inland at the edges of ponds on the 2nd; one inland on dry tundra on the 7th; a few scattered on dry tundra on the 13th; a male collected near the beach on August 16. Our latest date for the species in southeastern Victoria Island was August 26 (two juveniles near beach of Wellington Bay, 1960).

Mortality

One adult Baird's Sandpiper (lacking remiges) was found in a Snowy Owl that was shot on Jenny Lind Island on June 28, 1962.

Eskimo children at Cambridge Bay snared adults at nests. One adult male was found dead in a snare beside its eggs on June 27, 1960. The children also piled stones about the nests of this species. A nest containing three newly hatched chicks (banded) and a pipped egg on July 15, 1960, was completely covered over with rocks when later checked that day. The three young were dead, probably from exposure; the egg was missing.

A nest containing four eggs on June 15, 1960, was completely covered over with rocks. The adult sandpipers continued to incubate the eggs by entering through an opening in the rock enclosure.

Banding

The following adult Baird's Sandpipers were banded in the Cambridge Bay area in 1960: one on June 28; one on June 29; one on July 3. The following were banded in 1962: one on June 14, five on June 15, one on June 16, one on June 17. All these birds were banded at the nest; two banded at the nest were paired.

One feathered but flightless juvenile was banded near Cambridge Bay on July 21, 1960.

The following downy young were banded in or near the nest at Cambridge Bay in 1960: four siblings and three siblings on June 29; four siblings on July 3; three siblings on July 6; one on July 7; one on July 8. In 1962, one fairly large downy was banded at Cambridge Bay on July 8.

Baird's Sandpiper 58-115218, banded when newly hatched on July 6, 1960, was fledged and unattended when collected at the Cambridge Bay beach two miles from the nest on July 26 (*see* Specimens below).

Specimens

Seven adult males were collected: two at Cambridge Bay in 1960 respectively on June 18 and 27; three at Cambridge Bay in 1962 respectively on June 7, June 7, and July 23; two on Jenny Lind Island in 1962 respectively on June 30 and July 2. Weights (gm) and measurements (mm) of the seven: weight 32.0 to 44.0 (av. 38.57), wing chord 118 to 125 (120.59), tail 49.5 to 55.0 (53.3), exposed culmen 20.5 to 22.5 (22.0), tarsus 21.5 to 23.0 (22.42). Body plumage, particularly of the chest, of specimens collected during mid-June or later was worn. Most of the streaked chest plumage

of the male collected on July 23 had been replaced by fresh buffy plumage; however, the upper parts had many bold feathers of the breeding plumage.

Two adult females (weight of one 42.0, wing chord 120 to 122, tail 52.0 to 54.0, exposed culmen 22.0 to 23.0, tarsus 21.5 to 22.0) were collected at Cambridge Bay respectively on June 17, 1960, and June 7, 1962. Body plumage of the one collected on June 17 was worn.

Three fledged male juveniles were collected at Cambridge Bay: one in 1960 on July 21, and two in 1962 respectively on July 23 and August 16. Respective weights and measurements of the three: weight 31.0 – 35.0 – 41.0, wing chord 104 – 97.0 – 122. Down was conspicuous about the head, neck, and rump areas of the two collected during July 21–23. Bill, legs, and feet of all three were dark grey, nearly black.

Five fledged female juveniles were collected: two at Cambridge Bay in 1960 on July 26 and August 14, respectively; one at Wellington Bay on August 26, 1960; two at Cambridge Bay in 1962 on July 23. Respective weights and measurements of the two collected on July 23: weight 39.0 to 38.5, wing chord 104 each. Weights and measurements of two collected in August were similar to those of adults: weight of one 42.0, wing chord 120 to 123, tail 50.0 to 51.0, exposed culmen 22.0 to 22.5, tarsus 20.0 to 24.0. Down was conspicuous about the head, neck, and rump areas of the specimens collected in July. Colours of soft parts were similar to those of male juveniles described above.

The female juvenile collected July 26 was a specimen of known age, since it was banded at the nest when newly hatched on July 6. This 20-day-old bird (weight 25.0, wing chord 82.0, tail 23.0, exposed culmen 18.5, tarsus 23.5) was very downy on the head and neck, the juvenal feathers of these areas being conspicuous only on the crown and cheeks. Down was also conspicuous on the rump, thighs, and mid-pectoral region. Remiges and rectrices were sheathed extensively at the base. It was a typical juvenile in having a boldly marked dorsum and buffy pectoral region that was distinctly streaked with small spots of darker brown.

One fairly large downy female (weight 22.0, exposed culmen 14.5, tarsus 21.5) was collected at Cambridge Bay on July 11, 1962. Juvenal feathers were breaking out on back and sides; quills were 15.5 mm long. Bill, legs, and feet were brownish grey.

Nine small downies were collected at Cambridge Bay. One newly hatched male in the nest and two male siblings probably not more than 36 hours old when found out of the nest were collected on June 30, 1960. A male and female, probably not more than 72 hours old, were killed by native children in 1960 respectively on July 3 and 7. Two male siblings and one female sibling were in the nest when killed by a native child on July 15, 1960. One downy of uncertain sex was in the nest when collected on July 6, 1962. Newly hatched downies weighed 6.0 to 7.0 (gm); their bills were 8.5 to 9.0 (mm) long, tarsi 18.5 to 19.0 long. Colours of soft parts: bill black, legs and feet dark bluish grey.

One piped egg was collected at Cambridge Bay on July 6, 1960, and preserved in alcohol.

Fifteen sets of four eggs each with nest linings were collected at Cambridge Bay: six sets in 1960 during June 15 – 27, nine sets in 1962 during June

14-19. Measurements of the 60 eggs: length 32.1 to 36.2 (34.18), width 23.0 to 25.7 (24.13). The ground colour of these many eggs varied from very pale grey, nearly white, to brownish tan or buff. The overlaying spots and blotches of lavender and reddish brown were sparse to very dense, only slightly whorled and sparingly covered by darker scrawls. The reddish-brown colour characterized the egg of Baird's Sandpiper.

Annual Breeding Cycle

The Baird's Sandpiper arrives in southeastern Victoria Island in late May or early June. Courtship and pairing start almost immediately. The territory is small and is essentially limited to the dry tundra. The dry habitat is barren wind-swept ridges or comparatively well-vegetated slopes overlooking marine or fresh waters or wet tundra. Egg-laying starts in early June and culminates in mid-June. It declines rapidly after June 20 when aerial displays become sporadic. The clutch size is four. Both sexes incubate early and late in the period, which is 21 to 22 days. Young from early nestings hatch in late June. Most young hatch in early July, comparatively few in mid-July. Young leave the nest within 24 hours of hatching. They are accompanied by both parents in dry or wet tundra areas for five to seven days following hatching. Fledging occurs before the Baird's Sandpiper is 20 days old. The newly fledged bird is very downy, particularly about the head and neck. The parent-offspring bond may dissolve before the chick is 20 days old; it may also persist beyond that age. Many adults leave the region in late July. Some of the last to leave are males that attend fledged young. Whether females attend fledged young is not known. Unattended juveniles occur inland and at or near the marine beaches from late July to late August. September records are lacking.

Calidris alpina (Linnaeus) Dunlin

The Dunlin (*Calidris alpina pacifica*) is uncommon on Jenny Lind Island, where it possibly breeds. It was first noted by us on July 11, 1966, when Sutton collected one of three birds seen in a large marsh near camp. Thereafter, the species was noted regularly at the marsh until August 8, invariably one or two birds each time observed.

Two individuals were noted at a marshy lake area farther back from the coast on July 18. One of them defended a special area, but no young were observed. Although an adult was seen at the beach as late as August 12, we failed to note a juvenile.

Breeding Dunlins were noted a relatively short distance south of Jenny Lind Island on the mainland east of Perry River in the vicinity of Kangowan Lake. There, on June 16, 1966, we discovered a nest with four fresh eggs (collected) in wet tundra. In the same area on June 17 we found another with four, apparently fresh, eggs. These finds were significant. According to Hanson, *et al.* (1956), the species was not known to breed in the region. The record partially fills the extensive gap in the known breeding range for Arctic Canada (*see* Snyder, 1957).

Specimens

Two adult female Dunlins were collected inland on Jenny Lind Island in 1966, one each on July 11 and 23.

Calidris fuscicollis (Vieillot) White-rumped Sandpiper

One of the most abundant scolopacids on Jenny Lind Island, the White-rumped Sandpiper, is uncommon at Cambridge Bay where a few adults have been recorded. Although the species probably breeds in other places in southeastern Victoria Island, its status there is poorly known.

Small numbers of juveniles were recorded in 1960 and 1962 in the Cambridge Bay area, but whether they were local birds or from afar is not known. Two juveniles (female collected) were noted at 69°42' N, 108°35' W, about 60 miles inland from Byron Bay, on August 8, 1960. Juveniles were also noted that year at Anderson Bay on August 20 (flock of 20 feeding in tidal pool) and at Wellington Bay on August 26 (flock of 12 near beach).

Previous Records

Small downies (specimens in National Museum of Canada) were collected at De Haven Point by Captain Joseph Bernard during August 7-11 (probably 1919). Ellis (1956) stated that White-rumped Sandpipers "occurred occasionally" near Cambridge Bay in August of 1954.

Arrival

A solitary male performing aerial displays in wet tundra a mile inland from Cambridge Bay on June 7 was the only adult male White-rumped Sandpiper seen anywhere by us in 1960. The only adult female noted was one among fledged juveniles at the beach near Cape Colborne on August 13.

In 1962, also, the species was first seen in the Cambridge Bay area on June 7. That day three birds (male collected) fed in wet tundra near the head of the bay but did not perform display flights. A lone female was collected there on June 8.

No doubt these sandpipers had arrived early on the Jenny Lind Island breeding grounds, for many clutches were completed by June 20. In other parts of Canada the arrival may be late.¹ On Bylot Island, the northeasternmost breeding ground known for the species, the first White-rumped Sandpipers arrived on June 19 (Drury, 1961).

In 1966 the species was observed near the upper end of Cambridge Bay on May 28, 29, and 30 (one bird each date); the one seen on May 30 was a displaying male.

Nesting

Nesting White-rumped Sandpipers were observed by us on Jenny Lind Island, from June 20 through July 5 in 1962. By June 20 the population had settled down on the breeding grounds. Of 56 eggs examined during June 20-26 all contained very small embryos of various ages, indicating that egg-

¹Peak numbers of migrating White-rumped Sandpipers pass through Kansas in late May.

laying had taken place from about June 15. The finding of pipped eggs on July 5 indicated that egg-laying in at least one nest had taken place as early as June 11. A nest with three eggs on June 25 held four eggs on the 26th, clearly showing that egg-laying also occurred after June 20.

The species bred side by side with Pectoral and Semipalmated sandpipers in wet tundra areas that contained numerous hummocks thickly upgrown to mosses, sedges, and grasses. These well-vegetated areas were often very wet, although the higher edges gradually dried and by late June some nests were over fairly dry ground. Habitat preference of this sort has been reported all across the Canadian Arctic Archipelago (Sutton, 1932; Snyder, 1957; Drury, *ibid.*; Manning and Macpherson, 1961). According to Holmes and Pitelka (1962), the nesting habitat near Point Barrow, Alaska, is "relatively high, well-drained ridges inland from the coast."

The population of breeding White-rumped Sandpipers on Jenny Lind Island was dense in places. Probably 30 or more females occupied a hundred acres of suitable habitat. Nests of three were within 100 yards of each other; two nests were only 13 yards apart. It appeared certain that there were many more females in the breeding areas than males. Females nested within areas defended by males, but we observed no male territories exclusive of females. Polygamy is suggested here, but we failed to demonstrate that this was actually the case.

Animosity existed between the two females that nested close together. When flushed from their nests at the same time, they sometimes ran into each other, and sparring and some chasing ensued. The one male defending the area quickly flew in and broke up the fracas.

Nests of the White-rumped Sandpiper were fairly deep cups in hummocks and were lined chiefly with dry willow leaves and bits of mosses and lichens. These were well concealed by grasses and sedges. Clutch size at the 20 nests observed was four.

Behavioural characteristics and the somewhat enlarged throat of the male made it possible to distinguish the sexes. It was our experience that only females flushed from nests, a fact further borne out by the collecting of three females at nests. One individual caught by hand and banded at the nest was almost certainly a female; it was the only bird seen at the nest during limited observation (*see* Supplement, p. 222).

Unlike the Pectoral Sandpiper, the female White-rumped Sandpiper incubated closely and even flushed underfoot. With tail pressed down and spread, body feathers puffed out, she ran along the ground emitting clicking noises and twitters, occasionally spreading or lifting wings. Running back towards the nest she stopped abruptly. Then she leaped straight out at us and fluttered before our faces, skilfully dodging our hands, however. Not infrequently the incubating bird flew *directly* from her eggs and fluttered before us as we approached. This fluttering in one's face appears to be characteristic (*see* Drury, *ibid.*). Baird's Sandpiper, at Cambridge Bay, behaved similarly when nest flushed, although the fluttering in mid-air was noted but one time in that species. Nothing like this fluttering has been observed by us in other scolopacids.

Although territorial behaviour and displaying were on the decline, a number of males were still active after June 20. Since ground displays and aerial

performances have been described in detail (see Sutton, *ibid.*, and Drury, *ibid.*), we have little to add. It may be significant, however, that the male on a territory quickly responded to any female that we happened to flush from a nest. The male, usually perched in a favourite spot, flew immediately to the displaced female. With tail perfectly upright, wings stretched out from body, head down, he uttered rapid clicking noises and ran close behind the female. The movement took the pair away from the nest and terminated either in a swift flight chase or a simple parting. This behaviour was remarkably like that of the male Pectoral Sandpiper that performed under similar circumstances. These male White-rumped Sandpipers, like the male Pectoral Sandpipers, chased females of other species of sandpipers that had been displaced from nests.

Departure

Adult male White-rumped Sandpipers were present on Jenny Lind Island the day of our departure in 1962 on July 5. By that time, however, their numbers had decreased appreciably. Our latest date for an adult female was August 13 (Cambridge Bay beach, 1960).

Juveniles capable of strong flight were recorded in the Cambridge Bay area in 1960 as follows: seven scattered along beach near Cape Colborne on August 13; two together at edge of stream a mile inland on August 15; two together at edge of pool six miles inland, and three together on dry tundra a mile inland, on August 16. The following were recorded there in 1962: four scattered near beach on August 16; a flying flock of 15 birds and three solitary individuals, about two miles inland on August 21; two together within a mile of the bay on August 22. Our latest date for juveniles was August 26 (flock of 12 near Wellington Bay beach, 1960).

Banding

One adult White-rumped Sandpiper was banded at the nest on Jenny Lind Island on June 22, 1962.

Specimens

Three adult male White-rumped Sandpipers were collected in 1962: one at Cambridge Bay on June 7 and two on Jenny Lind Island respectively on June 20 and 22. Weights (gm) and measurements (mm) of the three: weight 42.0 to 45.0 (av. 43.33), wing chord 117 to 119 (117.66), tail 49.0 to 50.0 (49.1), exposed culmen 22.4 to 23.0 (22.66), tarsus 23.5 to 25.0 (24.5). The throats of all three males contained a vascularized, flaccid tissue similar to, but much less developed than, those of the Pectoral Sandpiper.

Six adult females were collected: two at Cambridge Bay respectively on August 13, 1960, and June 8, 1962; four on Jenny Lind Island in 1962 during June 20–25. Weights and measurements of the six: weight 37.0 to 51.0 (av. of five 45.8), wing chord 116 to 123 (119.5), tail 49.0 to 57.0 (52.75), exposed culmen 23.5 to 27.0 (24.7), tarsus 23.5 to 26.0 (24.5).

Two fledged male juveniles (weight 35.0 to 36.0, wing chord 114 to 120) were collected at Cambridge Bay in 1962 respectively on August 16 and 21. Colours of soft parts: bill dusky with slight olive tinge at base; legs and feet dark olive grey.

Seven fledged female juveniles were collected: one (weight 38.0, wing chord 116) about 60 miles north of Byron Bay on August 8, 1960; two (weight 36.0 to 43.0, wing chord 116 each) at Cambridge Bay in 1960 on August 13; four (weight 38.0 to 44.0, wing chord 118 to 123) at Cambridge Bay in 1962 during August 16–22. Colours of soft parts were similar to those of males described above. Down was conspicuous on the neck of one specimen (August 16).

Three newly hatched downies were preserved in 1962. One male (exposed culmen 7.5, tarsus 20.0) hatched on July 12 from an egg collected (July 5) on Jenny Lind Island. One downy female (weight 5.0, exposed culmen 10.0, tarsus 20.0) hatched on July 7 from an egg collected (July 5) on Jenny Lind Island; its sibling (sex uncertain, exposed culmen 9.0, tarsus 18.0) hatched on July 6. All three eggs were incubated artificially at Cambridge Bay, and the three young were preserved shortly after hatching. The downy male was painted directly from life by Sutton.

Fourteen egg sets with nests were collected on Jenny Lind Island in 1962 during June 20–26. The fourteen sets contained four eggs each (two eggs of one set were broken). Measurements of 54 eggs: length 31.1 to 35.5 (33.26), width 23.0 to 24.8 (23.93). The ground colour of 80 eggs observed on Jenny Lind Island was invariably green, from very pale to very dark green or olive. All were separable from eggs of other scolopacids breeding in the region.

Annual Breeding Cycle

A few White-rumped Sandpipers of both sexes arrive in the Cambridge Bay area in late May or early June. Although some males perform aerial displays there, nothing is known of their nesting. The species arrives in number on the breeding grounds of Jenny Lind Island early, for egg-laying there reaches a peak before June 20. Males showing a slightly enlarged throat perform within respective territories, which may have a preponderance of female birds. Nests are in hummocky wet tundra often within the territory of the male. The clutch is four eggs, perhaps three occasionally. Incubation by the female alone starts slightly before or after completion of the clutch. The period of incubation is 22 days. Male activity in the breeding areas declines rapidly in late June and virtually ends by July 1 when the first young hatch. Many young hatch by July 12, by which time adult males are scarce. The female alone attends the brood until fledging time. Young fledge when 15 to 17 days old. Some fledge as early as July 18. Juveniles remain inland for a short time following fledging. Many juveniles but very few adults are at the marine beaches in early August. Adults occur there as late as August 13, juveniles as late as August 26, probably later.

***Calidris melanotos* (Vieillot) Pectoral Sandpiper**

Pectoral Sandpipers are uncommon to locally abundant breeding birds in the Cambridge Bay area, i.e., their numbers fluctuate from year to year. Their status elsewhere in southeastern Victoria Island is little known. Quite a few Pectoral Sandpipers bred on Jenny Lind Island in 1962, but the species was uncommon there in 1966 (*see* Supplement, p. 222).

Eight unattended juveniles (two collected) were noted at approximately 69°42' N, 108°35' W, about 60 miles inland from Byron Bay on August 8, 1960.

Previous Records

Two eggs (in British Museum) of the Pectoral Sandpiper were collected at Cambridge Bay in 1853 by members of H.M.S. *Enterprise* (Oates, 1902). The species was tentatively identified at Cambridge Bay in 1954 by Ellis (1956).

Arrival

No large flocks of newly arrived Pectoral Sandpipers were seen anywhere in the Cambridge Bay area in 1960 or 1962. The birds dispersed inconspicuously on the breeding grounds where their numbers slowly increased until a peak was reached, probably in mid-June. Arrival of the species in northern Alaska is similar (Pitelka, 1959).

Of several Pectoral Sandpipers seen in a fast-thawing marsh near Cambridge Bay on June 1, 1960, two that were collected proved to be females. Males were not definitely noted before June 7 when one performed aerial displays.

In 1962, an individual of uncertain sex was noted on the grassy coastal slopes below the Augustus Hills on June 3. The species was first seen near Cambridge Bay that year on June 6 (one male). Performing males were first noted on June 7.

In 1966, this species was noted near the upper end of Cambridge Bay on May 29 (three singles and one pair).

Nesting

Breeding Pectoral Sandpipers inhabited the marsh and wet tundra areas, avoiding the drier slopes almost completely. They favoured extensive, hummocky terrain with low-lying ridges and innumerable ponds and lakes. The density of these birds was low in most places visited, however. Many suitable areas had no Pectoral Sandpipers, but some areas where the birds were scarce or absent in 1960 were occupied in 1962, when the total population was considerably greater.

Displaying males were not scattered evenly over the breeding areas but were more or less clustered. Territories were fairly close in some areas. Though skirmishes were seldom observed, there was considerable hooting, and several males could be heard at once. These local populations were not so dense as some described for the species in Alaska (*see* Pitelka, *ibid.*), but the best areas probably had two to three males per 100 acres. A somewhat higher density existed in comparable areas on Jenny Lind Island that year. There the breeding ground was wet, but the ridges and willows were less obvious.

The territories of some males breeding in the Cambridge Bay area were isolated by extensive dry tundra. The occupied ground was typically wet tundra upgrown to willows near water. One of these areas, checked regularly in 1960, covered only an acre of ground and was the territory per se of the



July 20, 1960. Incubating female Pectoral Sandpiper in wet tundra inland from Cambridge Bay. Concealing grasses and sedges were pushed aside by the authors attempting to photograph the nest from a blind. Invariably this bird pulled back the vegetative cover until completely hidden.

male, i.e., the place where he rested, fed, and performed from June 11 through June 29. Completely isolated, it was a quarter mile from comparable wet tundra and fully a mile from other known territories. One female mated and nested within the territory, which was periodically abandoned by the male for indefinite periods of time. Where the male went, we had no idea.

The male in absentia may have been accommodating females elsewhere, suggesting polygamy. This seemed to be the case with another male that visited regularly several small, adjoining marshy areas near Cambridge Bay in 1962. The question of whether the male is truly polygamous, however, will be settled only by observing marked individuals and nests. But it may be said that the territory is not vigorously maintained when the male population is low.

According to Pitelka (*ibid.*), nesting in the Pectoral Sandpiper typically occurs away from male territories. It was our experience that the female often, though not invariably, nested within the territory of a male. This was definitely the case with two isolated territories under observation. In both instances the nest was centrally located within the territory, and the male not infrequently flew directly over the nest, hooting as he went. Presumably these females were mated, respectively, to the males that occupied those territories.

Two nests, about a hundred yards apart, appeared to be within a single territory, again suggesting, but not proving, polygamy. Conceivably the females of these nests could have been mated to males occupying adjacent territories that were fairly close by. Each of three additional nests, including one on Jenny Lind Island, were within areas occupied by males, the territories of which were not studied. Still another nest was found far from any known territory in an area that was checked frequently for phalaropes and other species. Failing to note Pectoral Sandpipers of any sex in this area during June and early July, it came as a real surprise when we watched a female go to her nest there on July 13. It may be significant that her four eggs, when candled a week later, contained no embryos (none visible).

All eight nests found (including three by Waters) were well hidden in grassy hummocks over wet ground, or ground that had been previously wet. All were deep cups variously lined with dry material, chiefly grasses and sedges or dry willow leaves, and bits of other leaves, mosses, and lichens. Some nests were completely hidden from above by low, spreading willows. The importance of cover to these birds was evident when an incubating female reached out and pulled into place the grasses that we had pushed aside in taking pictures.

The incubating female typically left the nest well in advance of our approach and remained inconspicuous. For this reason alone the nests were difficult to locate, and quite a few escaped us. Females were also reluctant to return to the nest and bided their time by walking or simulating feeding. Distraction displays were not often observed, but there can be no question that the species feigns under certain conditions. Those birds that were surprised at the nest spread and pressed their tails low and scuttled over the ground, crying as they went. Soon the feigning degenerated to nervous, jerky gaits. One female invariably returned to her eggs within seconds whenever we entered a blind near her nest. The moment we left the blind she flushed

and feigned. At one observation we left the blind every 30 seconds for more than half an hour.

Egg-laying at Cambridge Bay in 1960 probably started before June 10, since four completed sets found during June 22–25 contained eggs with well-developed embryos. A set found on June 29 contained much smaller embryos, indicating egg-laying after June 20. The four eggs of another nest under observation in mid-July appeared to be sterile. The bird persisted in incubating them as late as July 22, after which date they were destroyed by some predator.

A female collected near Greiner Lake on June 13, 1962, had one ruptured follicle and a large egg in its oviduct. A nest with two fresh eggs was found within a half mile of Cambridge Bay on the 15th. The third egg of this nest was laid between 1:00 P.M. and 3:30 P.M. on the 16th, the fourth between 3:20 P.M. and 5:40 P.M. on the 17th. The nest was empty and deserted when checked on June 18, presumably having been destroyed by a predator. A set collected on Jenny Lind Island that year on June 20 proved fresh, indicating egg-laying in mid-June.

Males were observed near but not at the nest, and it appears certain that the females incubate exclusively. Upon leaving the nest the female immediately attracted the male, if he was present. The two usually flew off in a swift flight that carried them far from the territory. The male was so covetous of the female that he sometimes mistook other sandpiper species that we happened to flush and chased them. These chases he soon abandoned.

The male Pectoral Sandpiper displayed on the ground near the nest. With wings pressed in close, tail perfectly vertical, dewlap somewhat elevated but not puffed out, and with bill wide open and vibrating, he gobbled like a miniature turkey. He did not hoot; nor did he attempt copulation. The action took the pair away from the immediate vicinity of the nest, and the two birds eventually moved off in different directions. This remarkable display, similar to ground courtship displays described in detail by Pitelka (*ibid.*), was noted by us on three occasions, twice near Cambridge Bay (June 15–16) and once on Jenny Lind Island (June 22).

It would appear that the male has little to do with the raising of young, but he is not oblivious to them and will on occasion even defend. Near the north shore of Greiner Lake, on July 3, 1960, a pair (male collected) defended downy young (two collected) that had recently left the nest.¹ Highly agitated but not feigning in the usual sense, the male ran about chattering. He eventually led us to the chicks. Twice he left the ground and chased a *second* female that had been attracted to the spot. Each time he returned directly to a chick. The tense moment may have triggered a special response that took form in aerial pursuit, but it may also have reflected the male's bigamous behaviour.

July 3 was our earliest date for newly hatched Pectoral Sandpipers. Probably many chicks were running about by July 10. The behaviour of females indicated that this was the case. Males had largely left the breeding areas by then, but as late as July 13 Sutton noted a pair that almost certainly had

¹Allowing 23 days for incubation (Conover, 1926), these chicks must have hatched from eggs laid before June 11.

chicks. The male seemed to evince some concern but did not chatter as did the female.

Adult females remained with the young in the wet tundra areas, but occasionally they ventured onto the drier slopes.

Young started to fly in the Cambridge Bay area in late July. In 1960, a female and her stub-tailed juvenile that flew weakly were collected on July 23. On the other hand, a newly hatched chick was collected July 26, illustrating the overlap in the stages of nesting. Fledged young were first noted in 1962 on July 26, when Sutton collected one of two short-tailed birds that flew strongly. Adult females were solicitous of these young.

Departure

Flocking of male Pectoral Sandpipers was evident in the Cambridge Bay area in 1960 during July 5-7, after which date no adult males were observed. On Jenny Lind Island, in 1962, males flocked as early as June 26, when several groups of two to four birds each were noted. A flock of three was seen on the 28th, one of seven on the 30th. The largest flock observed contained 15 birds, all males, on July 1. Aerial displays were last observed July 2. Many males already had abandoned the Cambridge Bay area by the time we returned there on July 5. A few scattered individuals were noted (July 5, 7, 11, 13).

Departure of adult females was not obvious in the Cambridge Bay area. Three females that flew together on July 23 (1962) were the earliest indication of flocking. Latest date recorded for a female was August 10 (1960), but no doubt some females attended young in mid-August.

The break between female parent and offspring probably started to take place in early August. Strong flying juveniles were followed by the old birds then, but a declining interest in their care was manifest. Unattended young appeared to reach a peak in mid-August. They were not recorded anywhere in the Cambridge Bay area after August 18 in 1960; presumably a few were there. In 1962, they were noted regularly until August 25. There were but two observations thereafter—two birds together on September 1 and a lone female (collected by Sutton) on September 9. All these flying juveniles inhabited the dry tundra as well as the wet places, but not the marine beaches.

Specimens

Five adult male Pectoral Sandpipers were collected: two at Cambridge Bay in 1960 during July 2-3; two at Cambridge Bay in 1962 respectively on June 15 and July 7; one on Jenny Lind Island on June 20, 1962. Weights (gm) and measurements (mm) of the five: weight 93.0 to 101 (95.8); wing chord 132 to 141 (136.8), tail 59.0 to 64.0 (61.0), exposed culmen 27.5 to 31.0 (28.58), tarsus 26.5 to 29.0 (28.4). The throats of all were enlarged and highly vascularized. The flaccid tissue about the neck of one weighed 30.0 grams. None was moulting.

Six adult females were collected: four at Cambridge Bay in 1960 respectively on June 1 (2), July 23, and August 10; one at Cambridge Bay in 1962 on June 13; one on Jenny Lind Island on June 20, 1962. Weights and measurements of the six: weight 54.0 to 74.0 (av. of five 65.3), wing chord

123 to 127 (125.0), tail 51.0 to 56.0 (53.83), exposed culmen 25.0 to 28.5 (26.96), tarsus 27.5 to 29.5 (28.08). Contour feathers of the July 23 and August 10 specimens were frayed; body moult of August specimen was extensive.

Four fledged male juveniles were collected: one, about 60 miles north of Byron Bay, on August 8, 1960; three at Cambridge Bay, two in 1960 respectively on August 6 and 16, and one in 1962 on August 23. Weights and measurements of the four: weight 70.0 to 78.0 (75.75), wing chord 134 to 140 (138.5). Only traces of down were present.

Three fledged female juveniles were collected: one, about 60 miles north of Byron Bay, on August 8, 1960; two at Cambridge Bay in 1962 respectively on August 13 and September 9. Weights and measurements of the three: weight 50.0 to 59.5 (53.83), wing chord 123 each. Traces of down were present.

Two very recently fledged juveniles were collected at Cambridge Bay: a male (weight 63.0, wing chord 104) on July 26, 1962, and a female (weight 42.0, wing chord 90.0) on July 23, 1960. Down was conspicuous.

Six small downy young were collected at Cambridge Bay: one male (weight 8.0, exposed culmen 11.5, tarsus 22.0) on July 3, 1960; three male siblings on July 8, 1962; one female on July 26, 1960; one of uncertain sex on July 3, 1960. Colour of soft parts: bill, legs, and feet brownish olive.

Three sets of four eggs each with nests were collected: two at Cambridge Bay in 1960 respectively on June 25 and 29; one on Jenny Lind Island on June 20, 1962.

Annual Breeding Cycle

Small numbers of both sexes of Pectoral Sandpipers return to southeastern Victoria Island in late May or early June. Males soon defend territories in wet tundra areas. Pair formation is rapid and egg-laying soon takes place, possibly as early as June 7. The population gradually increases with new arrivals, and there is overlap between arrival and egg-laying. Displaying by males reaches a high point during mid-June but continues to the end of June and even into early July. Some males appear to mate with several females, but it is uncertain whether they mate with more than one at a time. Females nest within or outside the territory of the male. The nest is concealed in grassy hummocks that may be sheltered by willows. Eggs may be laid at one-day intervals, the clutch being four eggs. These are incubated exclusively by the female. Egg-laying probably culminates during June 15-25. It continues into early July when the first chicks hatch, resulting in overlap between egg-laying and hatching. Males may defend newly hatched chicks but play a minor role in their care. Some males flock as early as June 26. The majority flock during the first week of July and soon abandon the breeding ground. Older young began to fly in late July when the last hatching occurs, resulting in overlap between fledging and hatching. Females attend young for an uncertain time following fledging but mostly disappear by mid-August. Unattended juveniles may remain in the Cambridge Bay area until September 9, occupying the dry and wet tundras. The breeding schedule on Jenny Lind Island appears to be similar to that of Cambridge Bay.

Calidris pusilla (Linnaeus) Semipalmated Sandpiper

Nearly as common as Baird's Sandpiper in the Cambridge Bay area, the Semipalmated Sandpiper is the most abundant scolopacid of the wet tundra there. Although records are scarce, it probably occurs in many parts of southeastern Victoria Island, for the species breeds commonly on Jenny Lind Island and elsewhere in the Western Canadian Arctic.

It has been proposed that Semipalmated Sandpipers from eastern parts of the Canadian Arctic have longer and narrower bills than those breeding in Alaska and western parts of Canada. Whether separation of this sort is valid remains a moot question. Specimens from Cambridge Bay and Jenny Lind Island are small-billed and referable to the western population.

Arrival and Display

Arrival of Semipalmated Sandpipers at Cambridge Bay appears to be less predictable than the arrival of other scolopacids in the area. The species was first noted in 1960 on June 1. Since many individuals ran and flew about that day, it is assumed that at least a few of them had arrived in late May. Aerial display was common in many places by June 3 and probably reached a peak in activity during the following week or 10 days. However, it continued to the end of the month.

We failed to find these sandpipers anywhere in late May and the very first days of June in 1962. Two widely separated individuals were seen June 3 on the Augustus Hills. A single individual and a resting flock of four near the settlement on June 4 were the first seen at Cambridge Bay. Although we searched for displaying birds, aerial display was not observed before June 9. From that day on pairs were common, and the aerial displays continued without letup until our departure on June 19. Displays were common on Jenny Lind Island during June 20 to July 5. Returning to Cambridge Bay we noted full displays as late as July 7. Semipalmated Sandpipers were the only scolopacids performing commonly in July.

A displaying bird shot June 3, 1960, proved to be a male. This bird started and ended its display on the snow that was broken by exposed tops of high willows growing from wet tundra. The aerial display of the species was often only 25 to 50 feet above the tundra and did not cover much area. Commonly the displaying bird tread or hovered in mid-air, trilling during most of the performance. Wings were held high above the back during the abrupt descent. On Jenny Lind Island, Sutton witnessed what appears to be a remarkable performance for this bird: on June 26, three Semipalmated Sandpipers together displayed 200 feet above ground. They flew this way and that, all staying up for fully a minute and repeating a syllable monotonously. The one bird collected then proved to be a male.

In 1966, Semipalmated Sandpipers were noted in the Cambridge Bay area on May 29 and 30 (two birds each date; no displaying).

Nesting

Semipalmated Sandpipers were typically birds of hummocky wet tundra bordering marshy ponds at Cambridge Bay. They were not strictly confined to wet ground, for a good many pairs occupied the adjacent peaty areas that

were much drier and more exposed. None was found nesting on the truly barren ridges. Pairs were found commonly from near the bay to the marshes below the dry slopes of Mount Pelly. On Jenny Lind Island the pairs were found throughout the lowlands where the ground was very wet to fairly dry. The birds avoided altogether the barren sandy flats and rocky ridges.

Nests were in grassy hummocks, usually over water or damp ground, sometimes concealed by willows. Some were in well-vegetated spots on the drier, more exposed areas, but even they were well concealed, sometimes in a crack or depression between peaty hummocks. The cups were lined chiefly with dry willow leaves, a few dry grasses and sedges, lichens, and bits of moss. One atypical nest found by Waters was lined with wet grasses.

Egg-laying at Cambridge Bay started early in 1960. A clutch of four eggs found June 10 indicated laying as early as June 7. Fresh eggs were found throughout the remainder of June and even as late as July 3, when the final egg was laid at one nest. Nesting in 1962, following a late arrival, appeared to be somewhat later, though one nest with two eggs was found as early as July 12. Of 28 nests with eggs observed in both years at Cambridge Bay, more than 50 per cent of the nests were found from June 16 through the 26th, during which time a peak in laying may have occurred.

Twenty-seven nests at Cambridge Bay had four eggs each, and only one had a complete clutch of three eggs. The clutch at nine nests on Jenny Lind Island was four. A clutch of three at another nest last observed on June 26 may not have been complete. All of these Jenny Lind Island eggs had not been long incubated. The one set collected June 21 was fresh or nearly so.

Incubating adults flushed from nests, sometimes nearly underfoot. Distraction displays of varied intensity usually followed. One or the other parent returned to the eggs with little delay, but this species was not so confiding as Baird's and the White-rumped sandpipers.

There can be no doubt that both sexes incubate eggs early in the period, for at one nest we trapped and banded both members of the pair when each in turn settled on the eggs. Both sexes were shot at nests, and both had well-defined brood patches. Both attended pipped eggs and newly hatched young, but we failed to determine which sex incubated eggs and brooded young the most. Adults at one nest readily accepted the egg of a White-rumped Sandpiper that was substituted for one of their own.

The period of incubation from laying to hatching of the last egg of the clutch fell between 18 and 20 days, possibly 19 days, at one Cambridge Bay nest in 1960.

Young from very early nestings must have hatched some time in late June, but we did not actually see young before July 6; nor did we see newly hatched young after July 15. There can be little doubt, however, that there was overlap between egg-laying and hatching, and hatching and fledging.

In both years flying juveniles were first noted on July 21. By July 26 there were many flying juveniles, some still attended by adults. A fledged juvenile and its attending female parent were collected at Cambridge Bay on July 23, 1960. We failed to determine whether males attend fledged young, but it seems likely that they do (*see* Supplement, p. 223).

Departure

Adult Semipalmated Sandpipers became scarce in 1960 and 1962 at Cambridge Bay after July 25 when flying juveniles became obvious.

Unattended juveniles were among the very commonest of shore birds from about July 26 to August 10 in 1960. They frequented lake shores, roosting among boulders during the ever-increasing darkness. The largest numbers seen anywhere by us were at the shallow stream that flowed from Greiner Lake to the bay. Hundreds fed along the stream during July 30 to August 1, when only Baird's Sandpiper was equally common. Semipalmated Sandpiper juveniles also frequented the marine beaches. We did not record them there that year before August 13, when scattered individuals and small flocks ran along the beach a few miles north of Cape Colborne. Three juveniles fed at a pond near the settlement on August 16. A crippled individual found near the settlement on August 17 was the last seen that year.

Sutton and Stephens saw many juveniles in 1962 during July 26-28, but only a few thereafter. They recorded juveniles at the Cambridge Bay beach as early as August 9, and again on August 16. The species was seen next on August 21, when a single juvenile fed at one of the many lakes north of the settlement. This was the last Semipalmated Sandpiper observed at Cambridge Bay that year.

Banding

The following Semipalmated Sandpiper young were banded at Cambridge Bay in 1960: three newly hatched siblings, two on July 13 and one on July 14; one nearly fledged juvenile on July 22.

Three adults were banded at Cambridge Bay in 1962 on July 15: a mated pair at the nest; a single individual at the nest.

Specimens

Five adult male Semipalmated Sandpipers were collected: three at Cambridge Bay in 1960 respectively on June 3, 29, July 3; one at Cambridge Bay in 1962 on June 16; one on Jenny Lind Island in 1962 on June 21. Weights (gm) and measurements (mm) of the five: weight 25.0 to 28.0 (26.4), wing chord 89.0 to 95.0 (92.4), tail 38.0 to 43.5 (40.9), exposed culmen 16.8 to 18.2 (17.44), bill width 2.2 to 2.3 (2.24); culmen/bill width 7.52 to 8.26 (7.78), tarsus 20.5 to 22.0 (21.2). Bill size with respect to culmen/bill width is small and referable to the proposed western race *Calidris pusilla pusilla*.

Four adult females were collected at Cambridge Bay: three in 1960 respectively on June 20, 25, and July 23; one in 1962 on June 16. Weights and measurements of the four: weight 26.0 to 31.0 (28.5), wing chord 95.0 to 98.0 (96.62), tail 38.5 to 44.5 (41.75), exposed culmen 19.9 to 20.3 (20.12), bill width 2.1 to 2.3 (2.25), culmen/bill width 8.69 to 9.47 (8.95), tarsus 22.0 to 23.0 (22.37). Culmen/bill width measurements are referable to the race *pusilla*.

Five fledged male juveniles were collected at Cambridge Bay: four in 1960 respectively on July 21, 23, 24, August 13; one in 1962 on August 16. The three July specimens (weight 18.0 to 21.0, wing chord 70.0 to 76.0) had

considerable down that was obvious on head, neck, and rump areas. Down in two August specimens (weight 24.0 to 27.0, wing chord 90.0 to 96.5) was not obvious. An adult was attending the bird collected on July 23.

Two fledged female juveniles were collected at Cambridge Bay: one (weight 24.0, wing chord 92.0) with relatively little down on July 26, 1962; one (weight 21.0, wing chord 95.0) with virtually no down showing on August 17, 1960.

Two fairly large females, not fledged, were collected at Cambridge Bay: one (weight 20.0, wing chord 53.5) on July 18, 1960; one (wing chord 65.0) on August 2, 1962. Down was conspicuous on each.

Four downy young were collected at Cambridge Bay. Two were males taken from different nests in 1960 respectively on July 11 and 14. Two were siblings (one male, sex of one unknown) of an older age (quills visible) taken July 10, 1962. The July 14 bird (weight 4.5, exposed culmen 8.5, tarsus 19.0) was less than six hours old when preserved.

One pipped egg was collected at Cambridge Bay on July 6, 1960, and preserved in alcohol.

Nine sets of four eggs each with nests were collected: five at Cambridge Bay in 1960 respectively on June 10, 17, 20, 29, July 3; three at Cambridge Bay in 1962 respectively on June 15, 16, 17; one on Jenny Lind Island in 1962 on June 21. One egg was broken. The remaining 35 eggs measured in length 29.5 to 32.1 (30.76) and in width 20.6 to 22.7 (21.82).

Annual Breeding Cycle

Semipalmated Sandpipers return to southeastern Victoria Island and adjacent small islands in late May or early June. Aerial display over snow may occur commonly as early as June 3; or it may not be apparent before June 9, when much tundra is exposed. Displaying may be common and widespread in late June, even in July. The nesting areas are usually wet, but drier areas are also occupied. Egg-laying on a population basis may extend from about June 7 to July 3, resulting in overlap of certain phases of the reproductive cycle. The clutch size is four, rarely three. Both sexes incubate early and late in the period, which is about 19 days long. Both sexes attend young until after fledging. Hatching probably is continuous from late June to late July. Fourteen-day-old young fly strongly. Some young fledge by July 18. Adults of either sex are scarce after July 25 when many juveniles fly independently. Juveniles flock commonly at the inland waters and marine beaches. They become scarce everywhere in Cambridge Bay area after August 10. None has been recorded there after August 21.

***Micropalama himantopus* (Bonaparte) Stilt Sandpiper**

Pairs of Stilt Sandpipers are scattered throughout the Cambridge Bay area during the breeding season. Though not nearly so abundant as Baird's and Semipalmated sandpipers, they occur in many places and can be rightly called fairly common. The status of Stilt Sandpiper in other parts of southeastern Victoria Island is uncertain. It appears to be uncommon some years on Jenny

Lind Island where a few widely scattered pairs bred in 1962; the species was fairly common there in 1966 (*see* Supplement, p. 223).

A solitary juvenile was noted on the tundra a few hundred yards from the beach of Anderson Bay on August 20, 1960.

Previous Records

Captain Joseph Bernard collected Stilt Sandpipers in southern Victoria Island at Cash Point, and probably at other localities, but these records are vague. Ellis (1956) tentatively identified a few of these birds at Cambridge Bay in 1954.

Arrival

A Stilt Sandpiper was noted near the settlement of Cambridge Bay the day of our arrival there in 1960 on May 31. Possibly the same individual, believed to be a male, was seen there the following day, but no other was observed during a rather extensive hike across the tundra. Many birds must have arrived during June 2-3, for a good number were noted then in many places where none was seen a day or two earlier. Stilt Sandpipers were obviously paired on June 4. One male repeatedly chased a female and attempted copulation that day.

The first Stilt Sandpiper seen at Cambridge Bay in 1962 was a single individual that flew up from an exposed patch of turf and disappeared in the snow-storm of June 1. Later that day another individual was seen, and still later a male was collected from a flock of four that stood near the head of the bay. All these early arrivals were seen in places where the thaw was rapid. We failed to note a single Stilt Sandpiper on the fast-thawing Augustus Hills during June 2-3.

Many Stilt Sandpipers were in the Cambridge Bay area on May 28, 1966.

Aerial Display

Aerial display by Stilt Sandpipers at Cambridge Bay may start as soon as May 29, within a day or two of early arrival. Peak activity occurs during the second week of June, and then the displays become sporadic and virtually stop by June 20. Throughout much of the period of incubation the birds are unusually silent and remain inconspicuous until the young commence hatching in early July.

The displaying bird, presumably male, rises rapidly from the ground to varying heights of from 30 to 200 feet or more, usually about 75 to 100 feet. The flight that follows is erratic and unpredictable and may cover an extraordinarily wide area. Many a performing male will fly from one's view before returning, and some do not return at all. During flight the legs extend straight backwards, the bill is somewhat pointed down, and the head frequently moves from side to side. The tempo of the wing beat is variable. Wings move rapidly above and below the horizontal body plane but may at times move slowly through a narrow arc. At times they stop down to a slow beat, followed by a burst of speed. Moreover, the birds will frequently stop in mid-air and tread, occasionally changing altitude by suddenly moving up or down.



July 7, 1960. Incubating Stilt Sandpiper in wet tundra inland from Cambridge Bay. These sandpipers also nested in exposed places on the dry tundra. Uncommon on Jenny Lind Island, they could be found in many places in the Cambridge Bay area.

The common call during display is a high-pitched, oft-repeated *cree*, also *car-ree*. These are the calls given on steady wing beats. A softer call, recorded by Sutton as *quo-ick, quo-ick, quo-ick*, sometimes follows a change in wing beat; it may also accompany the beginning of the descent.

The descent is dramatic and swift. Setting wings straight out, or high above the back, the displaying bird glides down to ground; or he folds his wings and plunges earthward in a fast drop. The descent is often a combination of the two. Immediately upon alighting the bird may call *quo-ick, quo-ick quo-ick*. This probably explains why we occasionally heard these calls without seeing a bird in the air.

The displaying male did not often return to the spot where the flight had originated. More often he alighted some distance away—a quarter mile more or less. One individual left the ground and displayed for three to four minutes. Returning to ground he walked and fed for three to four minutes, after which time he sprang into the air and displayed for the next three to four minutes. He kept the pattern up for the 30 minutes we watched him. Displaying occurred at all hours, even when the sun was at its lowest on the horizon.

The display of the Stilt Sandpiper may be called high, rangy, unpredictable. In these characteristics it resembles the display of the Knot more closely than any other scolopacid observed by us. The common call of the Stilt Sandpiper's display, however, is remarkably similar to the common call of displaying Baird's Sandpipers. We can do no better than describe them as *cree* for both species, but the *cree* of the Stilt Sandpiper is higher pitched and can be heard at greater distances.

Nesting

Stilt Sandpipers occupied a variety of habitats in the Cambridge Bay area. They could be found commonly in wet tundra areas upgrown to fairly high willows. They also commonly occupied higher, much drier slopes with moderate vegetative cover, avoiding the truly barren ridge tops. The pairs appeared to be scattered fairly evenly over the tundra—one to three pairs per square mile on the average near the bay. Pairs were fairly common in the lower areas north of Greiner Lake and below Mount Pelly.

Egg-laying started early in 1960. A clutch of eggs found June 11 indicated laying as early as June 7. It may have started earlier at a nest first seen by us on June 13, for white personnel reportedly found the nest with four eggs on June 9. Waters collected a set on June 17 that may have been incubated for more than a week, judging from the size of the embryos. Another nest found by Waters contained two young and two eggs on June 30, indicating very early laying. One found by us held eggs as late as July 7. In 1962, nearly fresh eggs representing two complete clutches were found at Cambridge Bay respectively on June 17 and 18. A nest with one young and three eggs found July 3 on Jenny Lind Island indicated fairly early laying. Another Jenny Lind Island nest had four eggs not yet pipped when last seen on July 5.

Four of five nests observed at Cambridge Bay were in willowy wet tundra areas typical of the habitat occupied by Pectoral and Semipalmated sandpipers. They were fairly well concealed in dry turf near water. One was

partly covered by a willow branch; another was partly sheltered by a rock. The incubating bird at each of these nests gave a sharp cry and jumped off the eggs directly in front of us. It scuttled along with feathers somewhat puffed out, crying as it went. Soon the distraction display settled down to a nervous gait; then the bird repeatedly ran off only to return within a minute or two. Another nest found by Waters was in a "grassy area near willows and boulders."

One nest at Cambridge Bay and two on Jenny Lind Island were situated on very dry slopes where the aspect was decidedly exposed. The incubating birds of these nests left well in advance of our approach. They flew off but soon returned and eventually went to the eggs. When we were close to the nests the birds approached us and feigned a little. Generally their behaviour was like other sandpipers and plovers that nested under exposed conditions. A second nest observed by Waters at Cambridge Bay was on a dry slope "typical of Baird's Sandpiper habitat."

The clutch size of these nine nests was invariably four.

In the dry tundra habitat, the nest cup was lined chiefly with lichens, closely resembling nests of other species near by. In wet tundra, it was lined chiefly with dry willow leaves with lesser amounts of grasses, sedges, lichens, mosses, and so on, being hardly distinguishable from nests of other sandpipers in the same habitat. It would appear that the habitat largely determined the lining of these nests.

The incubating bird shot at one nest proved to be a male. Birds seen at other nests were thought to be males also, judging by bill size and barring of the belly plumage. Both sexes had well-defined brood patches, however, and both were very solicitous of newly hatched chicks. We failed to determine the incubation period at any one nest. Throughout this period the birds were extraordinarily silent and shy. Having arrived at Cambridge Bay late, Waters first believed that Stilt Sandpipers were uncommon. He saw relatively few up to the time of hatching, but then he saw the birds daily and commonly.

Hatching occurred as early as June 30 at Cambridge Bay, and as early as July 3 on Jenny Lind Island. One Cambridge Bay nest, under observation from July 1, had four pipped eggs on July 7. Twenty hours later there were four young, including one (collected) that was still wet. The remaining three young were in the nest 12 hours later but evidently left some time within the next 12 hours. Although the parent and the chicks were marked with bands, we failed to find them again.

Small downies recently out of the nest were first noted at Cambridge Bay on July 3 in 1960 and on July 6 in 1962. Both adults were highly solicitous of these young. They would temporarily abandon them by flying off, but they would return after a few minutes. Agitated adults gave a loud *jwet*, or *tuik*, or *tewk*; also a plaintive single or double *too-ee* that is remarkably similar to the distress call of Baird's Sandpiper. Following hatching, adult flying and singing became common again, but the songs were fragmentary and resembled those heard along the migration routes. Part of a song was heard as late as July 16 (1962).

A solitary, fledged juvenile fed at the edge of a peaty pond on July 21 in 1960. A fledged juvenile attended by an adult was noted July 23. An adult

attended a nearly fledged young that swam across a pond on July 24. That day we collected one of two flying juveniles that were attended by one adult. A flying juvenile was first noted on July 25 in 1962. Upon collecting, we found it had but a trace of down.

Departure

Adult Stilt Sandpipers became scarce in the Cambridge Bay area after July 20 in 1960 and 1962. They were last observed in 1960 on July 28 (one bird) and in 1962 on July 24 (one bird). The sex of these late individuals was not determined. Migrating flocks were not observed inland or at the beaches.

Juveniles were seen commonly after July 25 in both years. They did not frequent the marine beaches but fed inland at shallow ponds and streams. They were recorded most often on the tundra between Cambridge Bay and Mount Pelly, especially along the river that flowed from Greiner Lake to the bay. There they roosted among boulders during the ever-increasing darkness. Among the commonest of waders inland during early and mid-August, they were usually found in flocks of a few to 15 or 20 birds. The largest flock seen contained more than 35 juveniles (August 5, 1962). The last juvenile seen anywhere by us in 1960 was inland near Anderson Bay on August 20. In 1962, Sutton and Stephens noted juveniles regularly at tundra ponds near Cambridge Bay during August 20-25. Flocks of upwards of 20 birds were noted then. A flock of three birds was seen there on August 28 and another of three birds, the last observed, on August 29.

Banding

An adult Stilt Sandpiper of uncertain sex was banded, and colour banded, near its nest at Cambridge Bay on July 7, 1960. One nearly fledged juvenile was banded inland at Cambridge Bay on July 24, 1960. Five nestlings were banded: three siblings at Cambridge Bay on July 8, 1960; two siblings on Jenny Lind Island on July 4, 1962.

Specimens

Six adult male Stilt Sandpipers were collected at Cambridge Bay: two in 1960 respectively on June 13 and July 2; four in 1962 respectively on June 1, 11, 15, 17. Weights (gm) and measurements (mm) of the six: weight 56.0 to 61.0 (58.33); wing chord 122 to 128 (125.5), flattened wing 126 to 132 (129.66), tail 48.0 to 53.0 (51.58), exposed culmen 38.5 to 41.5 (40.16); tarsus 40.0 to 42.0 (41.16).

Three adult females were collected: two at Cambridge Bay respectively on July 2, 1960, and June 11, 1962; one on Jenny Lind Island June 24, 1962. Weights and measurements of the three: weight 63.0 to 70.0 (66.33), wing chord 128 to 133 (130.33), flattened wing 132 to 137 (134.33), tail 55.0 to 57.0 (56.16), exposed culmen 40.0 to 42.5 (41.16), tarsus 41.0 to 43.0 (41.83).

Brightness in the upper parts and particularly of the tertials varied considerably in both sexes. The palest male of the series was collected June 1, the brightest male on June 11. A female collected June 11 was very pale above and below; one collected July 2 was very bright in most areas.

Four male juveniles were collected at Cambridge Bay in 1960 respectively on July 24, 28, 30, and August 16. The July 24 specimen (weight 39.0, wing chord 97.0, tail 30.0, exposed culmen 24.5, tarsus 36.5) was probably a newly fledged juvenile, for slightly smaller young (*see* female juvenile below) were not quite capable of flight. The exact age of this bird is not known but likely falls within a 21 to 24 day age group. Down is obvious on head, neck, thighs, rump, and lower belly areas. Wing and tail measurements of the three older specimens closely approach or equal those of adults. The bills, however, are decidedly smaller (34.0 to 36.0), whereas the tarsi are a little longer (42.5 to 44.0). Down is detectable but inconspicuous on these older birds, which nevertheless show the brownish-buff colour below.

Three female juveniles were collected at Cambridge Bay: one in 1960 on July 30; two in 1962 respectively on July 18 and 25. The July 18 bird (weight 47.0, wing chord 88.0, tail 26.0, exposed culmen 28.5, tarsus 42.0) was not quite fledged. Down was conspicuous in many places. Its bill was blackish grey; its legs and feet were yellowish olive. Measurements of the older specimens fall far short of those of adults except in tarsal length. Down was not conspicuous, but the typical juvenal colour below was seen on both.

Five small downy young were collected: one male at Cambridge Bay on July 6, 1962; two females at Cambridge Bay respectively on July 3, 1960, and July 6, 1962; two females on Jenny Lind Island in 1962 respectively on July 3 and 4. The newly hatched downy weighs about 9.0 gm; its culmen is about 9.0 mm long; its tarsus is about 24.0 long. When 48 hours old, chicks may weigh 12.0 grams, and their bills and tarsi may be two to three millimetres longer. These downy young closely resemble those of other sandpipers breeding in the region, particularly Pectoral, White-rumped, and Semipalmated sandpipers. Pectoral and White-rumped sandpipers, however, have a much richer brown colour, especially of the head, pectoral, and lower belly areas.

One pipped egg was collected at Cambridge Bay on July 8, 1960, and preserved in alcohol.

Four sets of four eggs each with nests were collected at Cambridge Bay: two sets in 1960 respectively on June 11 and 13; two sets in 1962 respectively on June 17 and 18. Measurements of the 16 eggs: length 36.0 to 39.7 (37.23), width 25.7 to 27.0 (26.20). Although these eggs average slightly smaller than those of Pectoral Sandpipers, there is an overlap in egg measurements of the two species. Moreover, both show light and dark background colours and are similarly marked. Some eggs of Stilt Sandpiper have a light greenish cast not observed in the comparatively few Pectoral Sandpiper eggs checked by us. In any event, the eggs of the two species are remarkably alike and cannot always be separated on the basis of egg identification alone. Nests of the two species are also similar when built in the same type of habitat.

Annual Breeding Cycle

Arrival of Stilt Sandpipers in southeastern Victoria Island and adjacent small islands is rapid. A few birds arrive in the last days of May, but the majority probably arrive during the first two or three days of June. Spectacular aerial displays start immediately, and pairs form. By June 5, many pairs are scattered over the low-lying, snowy tundra where the thaw is rapid. The

nesting habitat varies and includes both wet and dry tundra areas. Egg-laying starts by the end of the first week of June and probably culminates within a week. Aerial display subsides rapidly in mid-June when incubation is under way. Both sexes incubate a clutch of four eggs for an undetermined period of time. They are shy and silent throughout the period but become conspicuous again following hatching of young. Some young hatch as early as June 30, others as late as July 12. Very late nestings have not yet been recorded. Hatching of the entire brood may take place within a 20-hour-period. Both sexes are solicitous of small young. Large flightless young and fledged juveniles are attended by males; they may be attended by adults other than their parents. Juveniles start to fly as early as July 18, and within a week many are flying. Adults become scarce after July 20, and there is no record of any after July 28. Some juveniles flock at the marine beaches in early August. Most remain inland following fledging. They frequent the fresh waters where they are among the commonest waders in early and mid-August. After August 20 they may become scarce, or they may remain common for another five days. The last birds remain inland as late as August 28.

Tryngites subruficollis (Vieillot) Buff-breasted Sandpiper

Heretofore the Buff-breasted Sandpiper has not been reported from Cambridge Bay where a few pairs breed. Its status elsewhere in southeastern Victoria Island is not known. On Jenny Lind Island in 1962 it was the second most abundant sandpiper (*see* Supplement, p. 224).

Territory and Courtship

Defence and courtship displays of the Buff-breasted Sandpiper are complex and differ markedly from those of other scolopacids of the region. In both displays the spread wing is of prime importance, probably functioning as a releaser of sorts. The male, standing upright, raises and spreads one or both wings, the inner surfaces of which are easily seen. The one or two wings are usually kept in motion. The action gives the illusion of flashing—a most conspicuous sight. Wing-waving or -flashing also occurs off the breeding grounds and has been reported along the migration routes (Rowan, 1927; Oring, 1964).

If it were not for the wing flashing, these sandpipers would have been easily overlooked, since their plumage blended perfectly with the tundra. On Jenny Lind Island, in areas where the birds were plentiful in 1962, it was not uncommon to see a few to upwards of a dozen males flashing all at once in a radius of several hundred yards. The high density of the male population was further reflected in frequent skirmishes, which were noted from June 20 through July 5 that year.

The male on territory often displayed before any moving object, including us. Upon detecting one of his own kind he invariably displayed, sometimes giving chase. Twice we watched a defending male suddenly flash a wing and dash after another Buff-breasted Sandpiper that was flying so far away it was barely visible. Flying from sight, he soon returned to his territory. Some males, displaying within a relatively short distance of each other, did not chase; this suggests that the size of the defended area may also be small.



June 24, 1962. Incubating female Buff-breasted Sandpiper on Jenny Lind Island. Within 40 feet of a displaying male, this bird walked to its four fresh eggs in a sprawling patch of lichens and grass-like sedges in a sandy spot miles from the sea. These sandpipers were equally abundant in wet tundra. Their flashing wings were distinctive and characteristic of Jenny Lind Island but not of Cambridge Bay where the species was uncommon.

Males seen displaying their wings within a few feet of each other without further show of animosity were probably not on territory.

When not displaying wings, the male with tail up often ran along behind a female. Occasionally he followed one into the territory of another male. When the males meet head-on, the ensuing fight is something to behold. Facing each other squarely, they literally bounce and leap over the ground. Without landing a blow they abruptly stop jumping and crouch, bill tip to bill tip, as though poised for the battle that never quite comes off. With fluttering wings and dangling legs they slowly rise side by side—in striking duet—to heights varying from 20 to 40 feet. The ascent, at about a 45-degree angle, progresses so slowly at times that the birds appear to tread in one spot. During the descent they part, each flying off in a different direction, the problem evidently having been solved for the moment. Murdock (1885) mentioned behaviour of this type. Whether females ever partake in such flights is not known to us.

Most puzzling was the fact that the male abandoned his special ground after defending it for several days running. Not only were individual territories abandoned, but seemingly whole areas with many displaying males. Other places with few or no males suddenly became alive with them, giving the impression that the birds periodically established new territorial grounds. Although usually seen in the presence of males, the females were difficult to watch and follow. Their movements with respect to the floating territories, if these really existed, were not at all clear.

In the near presence of a female the male courted. He stood very erect, with tail raised or lowered. Both wings were spread and bent forward at the tips. At times he nearly 'embraced' the female (Figure 3). At the height of display he tipped his bill and gulped. If notes were uttered then, they were inaudible at a distance of 40 feet. We expected to hear 'ticking' notes already described for the species, for the throats of males collected then were somewhat flaccid and vascularized, though hardly comparable to those of Pectoral and White-rumped sandpipers.

Strangely, the male often courted while standing in a depression or low spot that half concealed his body. More often than not the female appeared disinterested in the display. This in itself is not surprising, but we failed to note copulation even once. The ground display of certain shorebirds, the Redshank (*Totanus totanus*) for example, is quickly followed by copulation.

So intent was the male Buff-breasted Sandpiper in his display that he courted other species. We noted two different individuals attempting to 'embrace' male Pectoral Sandpipers.

Our limited observations indicated that the males may have been polygamous. Inadequate time and our failure to find nests in areas close at hand precluded further study. Obviously the breeding behaviour of this species is extremely complicated.

Jenny Lind Island Habitat

In 1962 Buff-breasted Sandpipers inhabited the low, more or less great stretches of flat tundra on Jenny Lind Island, avoiding altogether rocky ridges. In these low areas they frequented well-drained sandy places with scant vegetation. Even more so they frequented well-vegetated hummocky

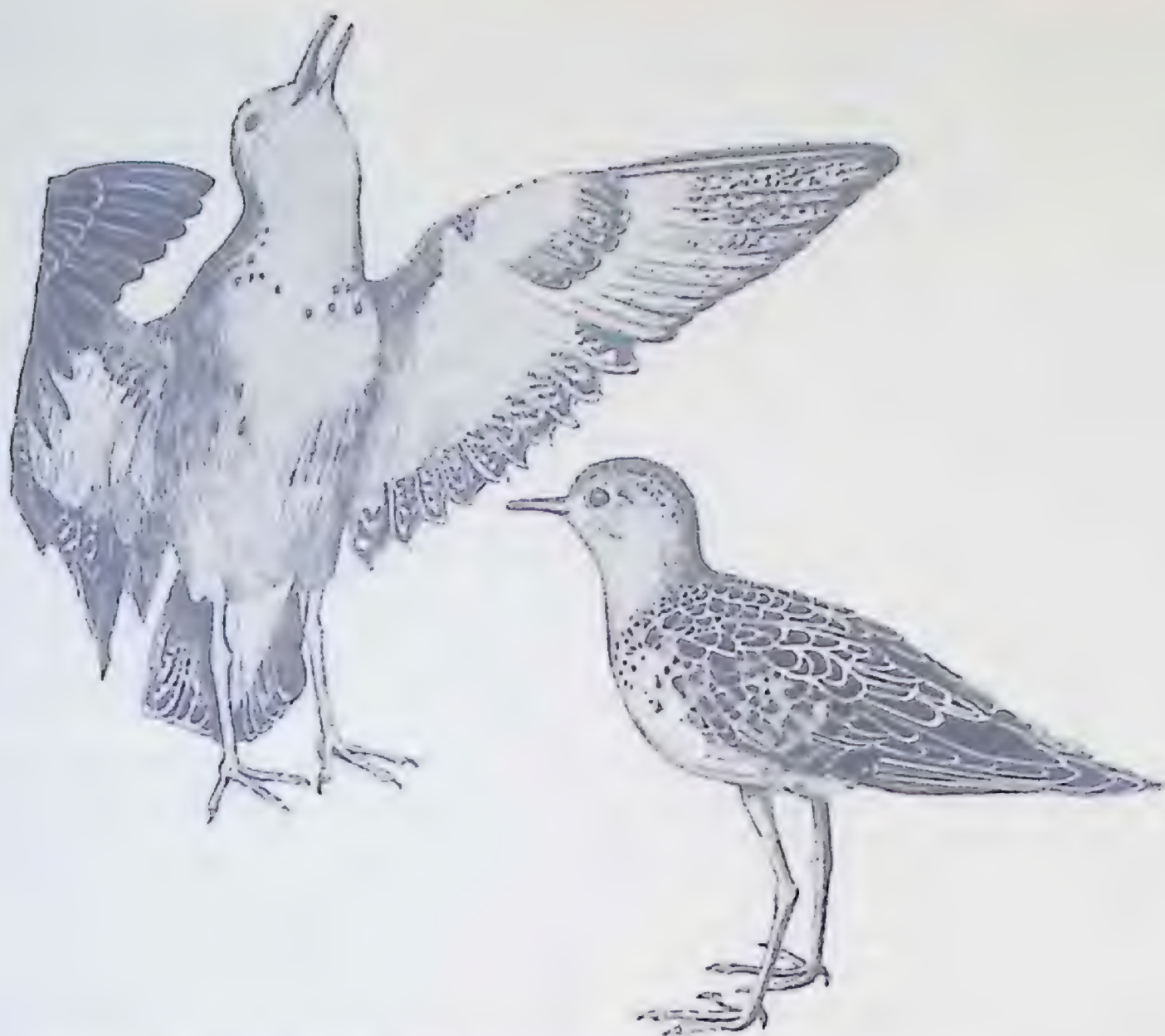


FIGURE 3—Ground display of Buff-breasted Sandpiper.

ground bordering marshy ponds. They even defended little islands of grassy hummocks completely surrounded by extensive marsh tundra. They were as much at home in the wet tundra as were the White-rumped, Pectoral, and Semipalmated sandpipers, which all shared essentially the same habitat (see Supplement, p. 224).

We often encountered displaying males, and also females, in both dry and wet areas, but our failure to find even a few of their nests in areas of high density close to our camp was mystifying. The one nest found on June 24 was miles inland. There, only 40 feet from a displaying male, we watched a female walk to its nest in a sprawling patch of lichens and grass-like sedges in a dry, sandy place. The bird was tame, allowing us to approach within three feet of the nest before flushing. Once flushed it flew only a short distance and soon returned to its four eggs, which were fresh. The nest was a rather deep cup lined with lichens (*Thamnolia vermicularis*), dry leaves (*Salix arctica*), and two species of sedges (*Carex rupestris* and *misandra*). All were dominant plants in the immediate vicinity. The one nest reported from King William Island by the Gjøa Expedition of 1903–1907 was found on June 24 also.

Cambridge Bay Records

So few Buff-breasted Sandpipers were seen in the Cambridge Bay area in 1960 and 1962 that it is not possible to draw satisfactory conclusions about their summer schedule. Presumably most of the population arrives there in

early June. Perhaps some birds arrive earlier, for the species has been recorded on Banks Island several times in late May (Manning, *et al.*, 1956).

One to four individuals were noted occasionally in 1960 from June 8 to August 1, in a two-square-mile area just east of the mouth of the stream that flows from Greiner Lake to Cambridge Bay. The tundra there was both wet and dry and was characterized by many small lakes, some marshy ponds, and numerous rocky ridges but no sand. The enlarged gonads (left testis 9.5 x 7.0 mm) of a male collected on July 5 was slight evidence of nesting. Noteworthy is the fact that during our many trips to the area we failed to see wing-flashing of any sort, indicating the low density of the male population. Three birds (male collected) going about together on July 11 were noticeably in heavy body moult. Three birds (male collected) seen together on August 1 had fresh body feathers.

The only Buff-breasted Sandpiper recorded by Waters that year was the decomposed remains of one a few miles southwest of Mount Pelly. A few miles south of the mountain we noted a solitary bird on July 25. In another area close by we collected a very fat male with fresh contour feathers on July 26.

The only other Buff-breasted Sandpiper seen that year was a solitary bird (age uncertain) several hundred yards back from the outer coast between Cambridge and Anderson bays on August 21—our latest date for the species.

In 1962, Sutton and Stephens noted Buff-breasted Sandpipers occasionally on the tundra between Cambridge Bay and Mount Pelly during July and August. Well inland on July 29, they collected an adult female and her three feathered juveniles that could not fly. This single family was our only proof of nesting for Victoria Island. Two fledged juveniles (one collected) were observed several miles inland from Cambridge Bay on August 21, but these birds could have come from afar.

Specimens

Ten adult male Buff-breasted Sandpipers [weight 63.0 to 94.0 gm (70.5), wing chord 127 to 133 mm (130.4), tail 58.5 to 68.0 (61.65), exposed culmen 19.0 to 20.5 (19.65), tarsus 31.0 to 34.0 (32.55)] were collected: five at Cambridge Bay, four in 1960 during July 5 to August 1, and one in 1962 on July 15; five on Jenny Lind Island in 1962 during June 24 to July 2. Those birds collected in early and mid-July were moulting heavily on head, neck, and pectoral regions. Those collected in late July and early August had many fresh contour feathers, but the flight feathers had not yet been replaced.

One adult female (weight 51.0, wing chord 120, tail 56.0, exposed culmen 16.5, tarsus 29.0) was collected with its flightless young at Cambridge Bay on July 29, 1962. It was undergoing extensive body moult, noticeably on the neck, pectoral, and rump regions. It had well-defined brood patches.

A fledged male juvenile (weight 70.0, wing chord 134) was collected at Cambridge Bay on August 21, 1962; a little down was present near base of tail.

Three large but flightless siblings were collected at Cambridge Bay on July 29, 1962. Two were males (weight 32.0 to 39.5, wing chord 72.0 to 73.5, exposed culmen 13.5 to 15.5, tarsus 30.0 to 32.0) and one was a

female (weight 33.5, wing chord 79.0, exposed culmen 14.0, tarsus 29.0). Although well feathered, down was conspicuous in these birds. Sutton painted the female directly from life.

One set of four eggs with nest was collected on Jenny Lind Island on June 24, 1962.

Annual Breeding Cycle

Numbers of Buff-breasted Sandpipers appear to be highly cyclic in southeastern Victoria Island and adjacent small islands. The birds may arrive on the breeding grounds as early as June 8 (Cambridge Bay), or as late as June 18 (Jenny Lind Island). Both wet and dry habitats are utilized. Territorial behaviour is complex, as is the courtship. Although the courtship may take place in wet areas, the females retire to the drier slopes to nest. They alone incubate the four eggs for an undetermined number of days. Fresh eggs occur in late June, probably in early July as well. Young hatch in mid-July and late July. They are attended by the female alone on the dry slopes and occasionally in wet areas. Males do not have brood patches and behave in a bigamous manner. Some moult the body plumage in July, when many flock inland. Some young are large and well feathered by August 3, but little is known concerning their fledging. Unattended juveniles occur inland as late as August 21. None has been recorded at the marine beaches.

Crocethia alba (Pallas) Sanderling

Apparently a rare breeder in southeastern Victoria Island, the Sanderling is one of the more common shorebirds of the marine beaches in August. A few pairs nest on Jenny Lind Island also, but the main body of Sanderlings breeds to the north.¹

Previous Records and Present Status

Fraser (1957) stated that he identified the Sanderling in southeastern Victoria Island on one occasion only. Apparently he observed its nest near Ferguson Lake during July 7-13, the hatching having taken place on the 13th. The record is more remarkable when it is realized that Fraser did not list another species of sandpiper for the region. Since he admittedly did not distinguish between members of this group, his statement that Sanderlings were "Undoubtedly common throughout the area" must be taken lightly.

In both years we failed to note Sanderlings anywhere in the Cambridge Bay region during the arrival and nesting periods. Having seen the nesting habitat earlier on Ellesmere Island, we were always watchful for the birds whenever we found what appeared to be suitable ground. From our wholly negative observations, we conclude that the Sanderling at best is a rare breeder in the region. The east and north coasts of Victoria Island may be better suited to the birds. In the National Museum of Canada there is a July (probably 1919) specimen of an adult female taken by Captain Joseph Bernard at De Haven Point.

¹Manning and Macpherson (1961) list the Sanderling as the most abundant sandpiper on Prince of Wales Island.

On Jenny Lind Island we noted Sanderlings on two occasions in 1962. A female (brood patches, swollen oviduct) was collected on high barren ground near an icy lake on June 25. On July 2, in a low sandy area, two adult males were shot from a flock of five birds thought to be Sanderlings only. One (largest testis 6.0 x 3.0) was brightly coloured and had distinct brood patches. The other, much paler, had somewhat smaller gonads (largest testis 5.0 x 1.5). A small number summered on the island in 1966 (see Supplement, p. 224).

Fledged young were first noted at the beaches of Cambridge Bay several miles north of Cape Colborne on August 13, 1960 (three birds). They were next seen east of Long Point on August 14 (five birds) and near the head of Cambridge Bay on the 15th (one bird). The Sanderling was by far the commonest shorebird all along the beach between Anderson and Cambridge bays during August 20-21, when many solitary individuals and flocks of upwards of a dozen birds were noted. They were much less numerous between Wellington and Cambridge bays on August 28—our latest date for the species on Victoria Island. However, Captain Joseph Bernard collected a female juvenile on Taylor Island near the east coast on September 11 in 1918.

Sutton did not often visit the marine beaches in 1962, but when he did on August 16 he noted several juveniles near Long Point. Presumably all these juveniles were from afar. We did not determine whether the main body was migrating east or west along the Victoria Island coast.

Specimens

Two adult male Sanderlings (weight 51.0 to 64.0 gm, wing chord 116 to 118 mm, tail 48.0 each, exposed culmen 23.5 to 24.5, tarsus 24.5 to 25.5) were collected on Jenny Lind Island on July 2, 1962.

One adult female (weight 62.0, wing chord 126, tail 53.5, exposed culmen 26.5, tarsus 26.5) was collected on Jenny Lind Island on June 25, 1962.

Five fledged male juveniles [weight 46.0 to 75.0 (53.6), wing chord 116 to 125 (120.2)] were collected at the beach, two at Cambridge Bay on August 13, 1960, one (extremely fat) at Starvation Cove on August 28, 1960, and two at Cambridge Bay (near Long Point) on August 16, 1962.

Two fledged female juveniles (weight 52.0 to 63.0, wing chord 121 to 124) were collected at the beach, one at Anderson Bay on August 21, 1960, and one near Long Point on August 16, 1962.

Phalaropus fulicarius (Linnaeus) Red Phalarope

Red Phalaropes breed abundantly in the Cambridge Bay area and probably in many places in southeastern Victoria Island. They are much more abundant than the Northern Phalarope, which appears to be everywhere uncommon in the region. On Jenny Lind Island, Red Phalaropes are among the more abundant breeders.

Previous Records

Anderson (1913) stated that the Red Phalarope was "locally common" in summer from northern Alaska to Victoria Island. In the National Museum of Canada there are two adult female specimens collected by Captain Joseph

Bernard at De Haven Point respectively on July 16 and 19, presumably in 1919. Another adult was taken by Bernard near there on Taylor Island on July 12. According to Ellis (1956), Red Phalaropes occurred occasionally at Cambridge Bay where they bred in 1954. Fraser (1957) noted the species on small ponds near the village of Cambridge Bay on June 30, 1955.

Arrival

Red Phalaropes arrived late at Cambridge Bay in 1960, and the first birds seen were paired. A pair was inland several miles from the head of the bay in late evening of June 11, and another pair was near the village on the 12th. The female of a pair collected at a marshy pond early on June 13 contained a hard-shelled egg about to be laid. The finding of a full clutch of eggs several days later (June 18) clearly showed that egg-laying was under way immediately after arrival—an interesting phenomenon since these late-arriving birds were laying no later than many other charadriiform species that had arrived a week or two earlier.

The species had arrived in force by June 14 and was abundant thereafter. Solitary individuals were exceptional. At the breeding ponds the aggressive females, whose fluttering flights could be heard at all hours, chased the males almost constantly.

In 1962, the species was first noted on June 10. That day an inseparable pair of birds was collected in a meadow near the head of the bay. The gonads of the male were enlarged (largest testis 12.0 x 7.0 mm), but the female was not yet laying (largest ovum 3.0 mm). A full clutch of eggs found June 18 showed that egg-laying had started no later than June 15, by which time the species had arrived in number. As in 1960, also, females actively engaged in rousing the interest of males. At times two females fought furiously in the presence of a male bird, fluttering upwards and facing each other in mid-air. Copulation was observed once (June 13).

Nesting

Red Phalaropes favoured the wet meadows or marsh tundra with networks of shallow ponds. Solitary pairs were seen, but usually several pairs were noted even in the small meadows, some containing only a pool of water. Pairs also bred occasionally near the edges of lakes upgrown to sedges.

The population near Cambridge Bay was locally dense, as many as three or four pairs per acre of ground in some places; but in many areas about Cambridge Bay marsh tundra was not extensive, being confined chiefly to low spots between stony ridges. On Jenny Lind Island, where marsh tundra extended for miles without break, pairs were more scattered. The total number of pairs, nevertheless, was large.

Of twenty nests observed near Cambridge Bay, including three found by Waters, all were well constructed and lined mostly with sedges and grasses in the turf of marsh tundra or on hummocks in wet tundra, not necessarily very close to water. Bits of dry leaves, twigs, and moss were used in the construction of most. One atypical nest was sheltered from above by low, spreading willows. Several nests were close together, six paces apart in one case

and eight paces apart in another. Nine Jenny Lind Island nests did not differ noticeably from those of Cambridge Bay.

The clutch size at these nests was four eggs, with the single exception of one clutch that had three.

The nests were well concealed and were found by flushing the males, which usually left the nests before we drew near. Once flushed, the males were reluctant to return to the eggs even during inclement weather. Females, remaining at the nesting ponds several days after the clutches were completed, repeatedly drove the males back to the nest—a behaviour also observed by Waters.

Although the period of incubation for the species in Greenland is stated to be 23 to 24 days (Pederson, *in* Salomonsen, 1950-51), it was less than 20 days at one, probably two, of our nests. Two eggs were marked at a nest on July 1, the third egg on July 2, and the fourth on July 3. All four eggs were pipped on July 21, and the following day all four chicks were in the nest. The youngest chick (down still wet) was not more than a few hours old. The period of incubation for the last egg was ascertained to be 18 days, 17 hours (error not greater than 14 hours) (*see* Supplement, p. 225).

A nest that held one egg on June 20 held four on June 23 and July 7. On July 11 there was one egg (no embryo) remaining, indicating that three young had left the nest successfully. In all probability, the second egg had been laid on June 21, the third on the 22nd, and the fourth on the 23rd. Even if incubation had started as early as June 22, the period for the fourth (or third) egg could not have been greater than 19 days, since the eggs must have hatched some time between July 7 and 11.

A nest with four pipped eggs on July 8 held three young and one egg (hatching) 11 hours and 55 minutes later on July 9. Not only did incubation start with the last egg, but some chicks abandoned the nest within a day of hatching. A nest that held a newly hatched chick (banded) and three eggs on July 11 held one egg (addled) 22 hours later. The banded chick, accompanied by two unbanded siblings, was found 50 yards from the nest.

Small downies out of the nest were noted as early as July 7 in 1960. These were attended by the male parent, which showed concern by nervously running back and forth among the grasses when we chased the chicks. He ran close to us but did not feign injury; we did not note injury feigning in the species.

Young that hatched at a nest on July 22 that year were from a late nesting. The male at another nest was incubating four eggs (each without an embryo) as late as July 27, after which date the eggs disappeared.

Newly hatched young were noted in 1962 only in mid-July; no doubt they occurred both earlier and later.

The male parent attended the brood through the fledging. The parent-offspring break followed soon afterwards. In 1960, fledged young were first noted July 24. Two unattended juveniles were several miles inland that day, and, since they flew strongly, it is assumed that they had been flying for at least a day. Fledged young were first noted in 1962 on August 1. Much later, on August 21, Sutton and Stephens noted a juvenile that could barely fly, indicating a really late nesting.

Departure

Adult female Red Phalaropes were conspicuous at the breeding places in late June, but their numbers dwindled rapidly in early July. One individual, pursuing a male, was noted in 1960 as late as July 7 (some young already out of the nest), but none was seen thereafter. In 1962, females were seen pursuing males as late as July 2; they were by themselves inland as late as July 13. Whether they left the country singly or in flocks was not determined. They simply vanished from the inland ponds and were not seen anywhere near the beaches or at sea.

Adult males, many attending young, remained inland long after their mates had departed. Following the fledging of young, the males did not abandon the land immediately. They remained inland, feeding alone or in small groups, sometimes with unattended juveniles, at the breeding spots or lakes close by. In late July many fed in the eddies of the Greiner Lake stream that flowed into Cambridge Bay. Some had been moulting body feathers in mid-July, and by the end of the month a good number were very pale ventrally. However, the moult was not nearly completed by departure time. These birds suddenly became scarce. Whether they left the country singly or flocked was not determined. They were last seen in 1960 on August 6 (one bird near fledged young), in 1962 on August 1 (one bird).

Juveniles remained inland after the male parents departed and were fairly common in mid-August. A few were seen near the beaches. A flock of four fed in a tidal pool near Anderson Bay on August 20, 1960. Three juveniles, one swimming in the ocean a few yards from shore, were noted near Long Point on August 16, 1962. After August 20, the birds were scarce everywhere. A lone individual at a pond a mile from Cambridge Bay on August 24 was the last of its kind seen in 1960. A young bird that could barely fly on August 21 was the last Red Phalarope noted at Cambridge Bay in 1962.

Dusting

Near Cambridge Bay on July 8, 1962, a Red Phalarope actively dusted its feathers in a little-used road near the Greiner Lake stream. Upon leaving the road the Phalarope flew directly to the river and splashed in the water. Examination of the spot where the bird had been revealed a rather deep dust bowl.

Banding

The following Red Phalaropes were banded near Cambridge Bay in 1960: three siblings in the nest on July 9; three siblings in the nest on July 10; three siblings, one in the nest on July 11 and two 50 yards from the nest on July 12; four siblings in the nest on July 22. A large chick, possibly a week old, was caught by hand and banded on July 24; it was caught in the same place on July 27 and released. A nearly fledged juvenile was banded on July 28. Another nearly fledged juvenile was banded on August 2.

In 1962, the following were banded near Cambridge Bay: four siblings near the nest on July 12; three siblings near the nest on July 17.

Specimens

Twelve adult male Red Phalaropes were collected: nine at Cambridge Bay in 1960, six during June 13-18 and three during August 1-6; one at Cambridge Bay on June 10, 1962; two on Jenny Lind Island during June 20-21 in 1962. Weights (gm) and measurements (mm) of nine June specimens: weight 43.0 to 60.0 (av. of eight birds 53.5); wing chord 119 to 127 (123.77), tail 60.0 to 68.0 (63.44), exposed culmen 20.5 to 23.5 (av. of eight birds 21.87), tarsus 21.0 to 22.5 (21.61). Weights and measurements of three August specimens in frayed feather: weight 46.0 to 48.0 (av. of two birds 47.0), wing chord 120 to 123 (122.0), tail 63.0 to 65.0 (64.0), exposed culmen 21.5 to 22.5 (22.0), tarsus 21.5 to 23.0 (22.16). Moults of body plumage had started in all three.

Eight adult females were collected: five at Cambridge Bay in 1960 during June 13-25; two at Cambridge Bay in 1962 during June 10-13; one on Jenny Lind Island on June 30, 1962. Weights and measurements of the eight: weight 49.5 to 77.0 (av. of six birds 62.25), wing chord 127 to 134 (131.25), tail 66.0 to 70.0 (67.5), exposed culmen 22.0 to 24.5 (23.18), tarsus 22.0 to 23.5 (22.5).

Two male juveniles were collected at Cambridge Bay: one fledged individual (weight 37.0, wing chord 93.5) on July 26, 1960; one nearly fledged individual (weight 27.5, wing chord 76.0) on August 1, 1962. Down was conspicuous on both specimens; colours of soft parts of unfledged bird: bill dark brown with reddish flesh-colour base; legs and feet pale orange-brown.

Four fledged female juveniles were collected at Cambridge Bay: two (weight 36.0 to 40.0, wing chord 87.0 to 92.0) in 1960 on July 24; two (weight 45.0 to 48.0, wing chord 116 to 133) in 1962 on August 1 and 16 respectively. Down was conspicuous on the July 24 and August 1 birds; a little down was present on the rump of the August 16 bird.

One fairly large female downy (weight 17.0) was collected at Cambridge Bay on July 18, 1960.

Four small downy young were collected at Cambridge Bay: two males (weight 4.5 to 5.0, exposed culmen 7.5 to 8.5, tarsus 17.0 to 18.5) on July 7, 1960; two females (weight of one 5.0, exposed culmen 7.5 to 8.5, tarsus 17.0 to 19.5) on July 7, 1960, and July 17, 1962. The one taken in 1962 was painted directly from life by Sutton.

Two pipped eggs were collected near Cambridge Bay in 1960 respectively on July 9 and 10 and preserved in alcohol.

Seven sets of four eggs each with nests were collected: four at Cambridge Bay in 1960 on June 18, 23, 24, and 24, respectively; one at Cambridge Bay on June 18, 1962; two on Jenny Lind Island in 1962 respectively on June 21 and July 5. The 28 eggs measure: length 29.8 to 35.0 (32.17), width 21.5 to 22.8 (22.3).

Annual Breeding Cycle

Red Phalaropes are among the last birds to arrive in southeastern Victoria Island. The vanguard arrives during June 10-11, and within two or three days many birds arrive. The newly arrived go immediately to nesting ground which is marsh or wet tundra near shallow ponds. The breeding

density may be high where the habitat is limited. The females court and fight furiously with one another in the presence of males. Their noisy flights are among the most familiar sounds at this time. Egg-laying starts almost immediately and is no later than that of many species that arrive earlier. Some clutches are completed during June 17-18. Egg-laying on a population basis is not well synchronized and continues into July. Most males are incubating in late June when many females leave the region. Only a few females remain into July. They pursue the last of the unemployed males. Females seen in mid-July are exceptional but probably account for unusually late fledging of some young. The clutch size is usually four, rarely three. The period of incubation for the last egg of the clutch is 18 to 19 days. Young leave the nest within a day of hatching and remain with the male parent through the fledging period. Unattended juveniles from early nestings are flying strongly by July 24 when some phalarope chicks are just hatching. Adult males, soon unemployed by the fledging of their young, do not necessarily abandon the land immediately. They may remain inland for a few days, feeding in the fresh waters with other males and unattended juveniles. Moulting of their body plumage is advanced but not completed before departure. Many adult males leave the region in late July; by early August males are scarce. Juveniles remain longer. Although some of them go to the marine beaches, they are most abundant at the fresh waters in mid-August. They become scarce everywhere in the region in late August, and there is no record of any there in September.

Lobipes lobatus (Linnaeus) Northern Phalarope

Heretofore not reported from Cambridge Bay, the Northern Phalarope probably is a rare breeder in southern Victoria Island. It apparently does not breed some years on Jenny Lind Island where we failed to note a single bird during June 19 to July 5 in 1962. A few bred on Jenny Lind Island in 1966 (see Supplement, p. 225).

Arrival and Probable Breeding at Cambridge Bay

A solitary male with enlarged gonads (left testis 12.0 x 6.0 mm), collected in a marshy meadow near the upper end of Cambridge Bay on June 5, was the only Northern Phalarope noted in the region that month in 1960. Another solitary male (left testis 14.0 x 9.0) was collected in the same meadow on June 7 in 1962. That year we also noted a single bird (sex uncertain) and two birds, possibly a pair, in a different marsh near the bay during June 15-16.¹

Waters reported seeing two Northern Phalaropes in a rather large lake near Mount Pelly on July 2, 1960. Likely these were the same birds we shot there the following day. Both proved to be adult females, which evidently had not bred (ovaries examined).

A recently fledged but unattended juvenile was collected in a marshy pond two miles inland from Cambridge Bay in 1960 on August 1. This bird could

¹According to Taverner (1916), two nests, one with four eggs and one with one egg, were collected by Captain Joseph Bernard at Coronation Gulf during June 28-29, 1911.

have come from afar, but it seemed probable that it had hatched not very far away. Older young of the year were seen August 9 (seven birds) in the river that drains Greiner Lake and again on August 13 (two birds) in a marshy pond several miles north of Cape Colborne.

Specimens

Two adult male Northern Phalaropes (weight 35.0 gm each, wing chord 105 to 106 mm, tail 48.5 to 49.0, exposed culmen 21.5 to 23.0, tarsus 20.5 to 21.0) were collected at Cambridge Bay, one in 1960 on June 5, the other in 1962 on June 7.

Two adult females (weight 41.0 to 42.0, wing chord 108 each, tail 49.5 to 51.0, exposed culmen 23.0 to 23.5, tarsus 20.0 to 22.0) were collected near Mount Pelly on July 3, 1960.

One fledged male juvenile (weight 37.0, wing chord 100) was collected at Cambridge Bay on August 9, 1960, and one fledged female juvenile (weight 27.0, wing chord 99.5) on August 1, 1960.

Annual Breeding Cycle

A few Northern Phalaropes return to southeastern Victoria Island in early June. Nothing is known of their nesting there. Unattended young of the year, probably local birds, occur at rivers and marshy ponds near the coast during August 1-13.

Stercorarius pomarinus (Temminck) Pomarine Jaeger

Pomarine Jaegers are fairly common birds in parts of southeastern Victoria Island. Highly selective in their choice of habitat, they are abundant in some areas but scarce or absent in others. Where found in the region, they are often the commonest of the three jaegers.

During the lemming high of 1960, these jaegers were especially numerous at Wellington Bay, being somewhat less abundant at Cambridge Bay. From Anderson Bay eastward they appeared to be much less common, although they occurred all the way to Albert Edward Bay (four birds, August 7). Barry, however, failed to note them beyond 70°30' N, while flying to the north coast on August 9.

During the lemming low of 1962, the Pomarine Jaegers returned to Cambridge Bay in fair numbers. Some of them remained in the region throughout June and July but did not breed, in this respect differing markedly from the other species of jaegers. Pomarine Jaegers were also present on Jenny Lind Island that year but did not breed, presumably because of the lack of lemmings there also (*see* Supplement, p. 226).

Previous Records

Fraser (1957) believed the Pomarine Jaeger to be nearly as common as the Long-tailed Jaeger in southeastern Victoria Island in 1955 when lemmings were scarce. He noted the species at Long Point on June 11, near Mount Pelly on June 17 and 18, while travelling by boat during the summer (late dates not recorded).

Arrival

The Pomarine Jaeger was already at Cambridge Bay the day of our arrival there in 1960, May 31 (one bird flying near the bay). Solitary birds on the hunt were also noted during the next few days. They flew low over the snowy slopes following straight courses for what appeared to be miles. The numbers of Pomarine Jaegers had increased noticeably by June 4. That day a pair showed some interest in a certain wet area, which later proved to be a territory. Paired birds were also noted June 5. Many Pomarine Jaegers had arrived by June 7.

We were especially watchful for early arrivals in 1962. The first (two birds) seen flew east along the coastal slopes below the Augustus Hills on June 2. The species was next seen well inland between Cambridge Bay and Mount Pelly on June 6. A dozen birds in all, they flew fairly high in twos and threes and appeared to be migrating northeastward. Years ago Anderson (1913) observed large numbers of Pomarine Jaegers flying "in twos and threes" toward the northeast from east of the Mackenzie River in early June. More recently Manning, *et al.* (1956) observed four Pomarine Jaegers flying northeastward from Sachs Harbour, Banks Island, on May 30. These few incidents suggest that Victoria Island birds arrive from the west rather than from the east. In 1966 the species was seen flying eastward over the tundra between Cambridge Bay and Greiner Lake on May 29 (flock of four birds).

Nesting

The myriads of lemmings forced into the open by the rapid June thaw of 1960 must have attracted transient jaegers as well as local birds. This may have been a factor explaining why Pomarine Jaegers seemed less abundant by mid-June than earlier, but many of these birds had simply settled on territory in large expanses of wet tundra which were relatively scattered in the Cambridge Bay region. In this sense, the nesting pairs were more or less concentrated in certain areas, giving the illusion that the birds were colonial in their habits. We agree with Pitelka, *et al.* (1955), that Pomarine Jaegers are not truly colonial; in fact, they are highly territorial.

Paired birds believed to have been mated and attached to a special area near Cambridge Bay on June 4 were likely the birds seen at the same place on June 12. The pair was distinctive, for one of the birds was light-phased and the other dark-phased.¹ The nest was located on June 13 when it contained one egg—our earliest egg date for the species. The second egg was laid on the 14th, but the nest was abandoned that day when one of the parent birds, the dark female, was shot by an Eskimo hunter and left on a rock. Observations earlier disclosed the fact that incubation had started with the first egg and that both sexes had incubated. Allowing 28 days for incubation (Pitelka, *et al.*, *ibid.*), the first young at this nest would have hatched no later than July 11.

Long stretches of wet tundra, broken here and there by innumerable knolls and low ridges, sprawled for miles from west of the DEW-Line Station to

¹Probably 10 to 15 per cent of the population at Cambridge and Wellington bays were dark phased.

Greiner Lake. Although a good many Pomarine Jaegers were on territory there, we failed to make a population estimate. We did not often visit this low country, but Waters found several nests there. One held two eggs, each with small embryos, on June 24; one held two nearly fresh eggs on June 25; one held one egg on June 25 and two eggs on the 26th; one had nearly fresh eggs as late as July 9. Still another, with nearly fresh eggs on July 10, was believed by Waters to have been a second attempt by a pair that had lost eggs earlier. A repeated nesting was also noted by Pitelka, *et al.* (*ibid.*).

Pomarine Jaegers at Cambridge Bay preferred areas near the coast to those farther inland, but a few pairs resided at least eight miles from the sea. A pair had two nearly fresh eggs in a large wet tundra area north of Greiner Lake on June 17. Waters found another pair with nearly fresh eggs near Mount Pelly on July 2.

The nest of the Pomarine Jaeger was invariably in wet tundra. It was a hollow in the turf, unlined or lined with a pad of grass or dry leaves. We did not observe nest building, nor did we have the opportunity to follow a nesting through to completion.

Departure

Pomarine Jaegers were the most abundant charadriiform birds seen at Wellington Bay during August 26-28. They were common several miles inland as well as at the beach. Much of the tundra north and east of the bay seemed ideal for the species and probably accounted for the dense populations there. Flying young were conspicuous. Single adults attended one or two recently fledged young, but we failed to see two adults attending the same fledgling. Some young were already on their own.

Adults and juveniles were also abundant along the outer coast between Wellington and Cambridge bays on August 28. Most were unattended juveniles that flew in low over our boat. The largest number seen flying together was six. We rarely saw Pomarine Jaegers of any age offshore at the upper end of Cambridge Bay.

Following our return from Jenny Lind Island on June 5, 1962, we noted the species only twice at Cambridge Bay: July 6 and 31, solitary bird each date. Juveniles were not seen anywhere by us that year.

Food

Pomarine Jaegers fed extensively on lemmings during the breeding year of 1960 when the microtines were so abundant. Adult birds collected both early and late in the season had eaten lemmings exclusively. A fledged juvenile collected in late August also had eaten a lemming.

Pomarine Jaegers hunted prey other than lemmings in 1960. In late July and early August certain adults, seemingly non-breeding individuals, hunted singly or in small groups in areas where the species had not nested. Two or three unemployed birds followed us on several occasions, apparently attracted to the lemmings and small birds that we happened to flush. They followed us to a recently abandoned Snowy Owl nest that held an addled egg. One of the

jaegers flew down and punctured the egg twice. Another time we saw a jaeger chase a small bird over a ridge.

In lieu of lemmings in 1962, the Pomarine Jaegers were forced to feed chiefly on insects and other prey. An adult collected that year near Cambridge Bay on June 13 had eaten an inch-long caterpillar.

Specimens

Two adult male Pomarine Jaegers [weight of one 665 gm, flattened wing 367 to 371 mm, tail 225 to 228, exposed culmen 36.0 to 39.0, tarsus 54.0 to 55.5] were collected at Cambridge Bay, one in 1960 on July 30 and one in 1962 on June 13.¹ Both were light-phased.

Two adult females [weight of one 775, flattened wing 358 to 372, tail 174 to 183, exposed culmen 39.0 to 41.5, tarsus 55.5 to 60.5] were collected in 1960, one at Cambridge Bay on June 15 and one at Wellington Bay on August 26. Both were dark-phased. The specimen collected in August had numerous body pin feathers.

One unsexed adult (flattened wing 366, tail 223, exposed culmen 38.0, tarsus 54.5) was collected at Cambridge Bay on June 2, 1960.

One fledged male juvenile (flattened wing 311, tail 130) was collected at Wellington Bay on August 26, 1960.

Two sets of two eggs each were collected at Cambridge Bay in 1960 respectively on June 14 and 17. One set was considerably larger than the other, the four eggs measuring: length 59.2 to 64.9 (62.25), width 43.5 to 46.3 (45.02).

Breeding Cycle

Pomarine Jaegers arrive in southeastern Victoria Island ahead of Parasitic and Long-tailed jaegers. Arriving in small groups from the west, the first ones appear in late May or on the first days of June. During good lemming years the numbers of Pomarine Jaegers increase rapidly in early June, when many solitary birds fly over the fast-thawing tundra near the coast. Pairing and selection of territory may take place as early as June 4, at least a week before egg-laying. The favoured nesting habitat is extensive wet tundra, preferably near the coast. By mid-June many pairs are established in the restricted habitat, and during nesting the species is rarely seen elsewhere. Egg-laying, which starts in mid-June, continues into late June. The clutch size is two. Incubation starts with the first egg. Both sexes incubate, but little is known about the incubation and fledging periods. Unattended juveniles are common over the marine waters by August 28. Unlike other species of jaegers, the Pomarine Jaegers are less numerous during poor lemming years and abandon the breeding areas early. Apparently they do not breed when lemmings are moderately abundant. The restricted habitat and the inability to breed during lemming-lows may explain why this species is less frequently observed, and apparently less abundant, than other jaegers in the Canadian Arctic as a whole.

¹The adult male collected in 1962 had enlarged gonads (testes 25.0 x 13.0 mm) but definitely was not breeding. Although the jaegers arrived in breeding condition, the absence of lemmings in some way must have inhibited further activity of the reproductive cycle.

Stercorarius parasiticus (Linnaeus) Parasitic Jaeger

Parasitic Jaegers are uncommon to locally abundant birds in southeastern Victoria Island where the species breeds independent of the lemming cycle.

During the lemming peak of 1960, Parasitic Jaegers were outnumbered five to one by each of two other species of jaegers in the Cambridge Bay area. They appeared to be equally uncommon at Albert Edward Bay where three birds were noted August 7. Not really common, they nevertheless were the most abundant jaeger along the Anderson Bay shore during August 20-21. At Wellington Bay, during August 26-28, they were about as common as Long-tailed Jaegers but far less common than Pomarine Jaegers.

Parasitic Jaegers were slightly more abundant at Cambridge Bay in 1962 when Pomarine Jaegers failed to breed during the lemming low. On Jenny Lind Island they were the commonest jaegers. Despite the paucity of lemmings, the pairs bred, three to four miles apart (*see* Supplement, p. 226).

Dark-phased Parasitic Jaegers were scarce. One flew alone near the head of Cambridge Bay on July 1, 1960.

Previous Records

Ellis (1956) stated that Parasitic Jaegers nested in small numbers at Cambridge Bay in 1954. Fraser (1957) apparently did not record the species anywhere in southeastern Victoria Island in 1955.

Arrival

Three Parasitic Jaegers flying together near the head of Cambridge Bay on June 4 were the first noted in 1960. Always uncommon there, the species was observed only occasionally during the arrival period. The one to three birds seen at one time raced above the land, annoying Snowy Owls especially with their spirited, noisy chases. Paired birds favoured certain wet tundra areas by June 11.

In 1962 the species was first observed near the head of Cambridge Bay on June 8 (one bird flying). Pairs were not definitely noted until June 15.

Nesting

The scattered Parasitic Jaegers nested in wet tundra which, in southeastern Victoria Island, often contained fairly high willows. This type of habitat was used by Pomarine Jaegers, but the two species segregated during nesting. Conceivably the slight rise in number of Parasitic Jaegers during the poor lemming year of 1962 was in part due to the lack of breeding Pomarine Jaegers that year.

Nests of Parasitic Jaegers were slight affairs on hummocks or dry spots in the wet environment.

Egg-laying by some pairs at Cambridge Bay in 1960 probably started in mid-June. A two-egg set found by Waters on June 27 had been incubated "about a week." Another of two eggs found July 3 was "well advanced." One egg of a two-egg clutch found July 10 was "pipped." Egg-laying continued into late June. A nest with one egg on June 23 held two on the 24th;

it was later abandoned when an Eskimo shot one of the parents.¹ The solitary egg of a nest near Mount Pelly first seen on July 10 was not pipped when last checked on July 19.

Two nests were observed in the Cambridge Bay area in 1962. One with two eggs on July 8 was not checked again. Another with two eggs on July 8 was empty on July 18, but two chicks were found close by.

Egg-laying on Jenny Lind Island took place in late June. A female collected June 25 contained a well-formed egg; its ovary indicated that one egg had already been laid. Another female, collected June 26, contained a hard-shelled egg; it had not laid previously. Fresh sets of two eggs each were found respectively on June 26 and 30. The nests were in wet tundra, but the willows there were dwarfed.

Both sexes incubated and attended chicks. Feigning injury near eggs or young, the parent birds wallowed and often waved a wing while lying on their sides. Sometimes they walked upright with wings dragging and sometimes they scuttled over the hummocks with partly spread wings. Regurgitation of food occurred during injury feigning. One pair feigned injury in water.

Strong flying young were first noted on August 13 (Cambridge Bay, 1962). One, still attended by an adult that feigned injury, was noted as late as August 26 (Wellington Bay, 1960).

Departure

Unemployed adults occurred along the coast between Anderson and Wellington bays in late August of 1960. No large flocks of migrating adults or young were noted. The relatively few birds gradually disappeared. The last one noted was a solitary adult at the beach of Cambridge Bay on August 29.

A few unemployed adults were noted regularly along the Cambridge Bay coast in late August of 1962. The last one seen was alone near the head of the bay on September 1.

Food

Parasitic Jaegers were seen catching and eating lemmings during the peak of 1960. All specimens collected then revealed only lemming remains in the alimentary canal. Although the hunting jaegers chased small birds that year, kills were not actually observed.

During the lemming low of 1962, the jaegers ate other foods, which obviously sufficed for breeding purposes. On occasion they were seen chasing small birds. One pair attempted to rob the nest of Snow Geese on Jenny Lind Island. Another pair was repelled by a Red-throated Loon protecting its nest from the marauders.

Despite our failure to locate lemmings, the jaegers caught a few. An adult female collected June 25 on Jenny Lind Island had eaten a lemming, a spider, insects, and a small, unidentifiable bird. An adult male collected there June 26 had eaten Rock Ptarmigan eggs. A fledged juvenile collected August 13 at Cambridge Bay had swallowed a whole Lapland Longspur from which the flight feathers had been removed.

¹Eskimos did not shoot jaegers for food. Apparently they became annoyed with pairs that viciously defended eggs or chicks.

Banding

One adult Parasitic Jaeger was live-trapped and banded within the settlement of Cambridge Bay on August 24, 1960.

Specimens

Six adult male Parasitic Jaegers were collected: three at Cambridge Bay in 1960 respectively on July 13, August 10 and 26; two near Wellington Bay in 1960 on August 27; one on Jenny Lind Island on June 26, 1962. Weights (gm) and measurements (mm) of the six: weight 429 to 475 (445.66), flattened wing 324 to 336 (329.83), tail 192 to 211 (202.66), exposed culmen 28.0 to 32.5 (29.83), bill from anterior edge of nasal fossa to tip 11.5 to 13.0 (12.25), tarsus 44.5 to 47.0 (av. of five 45.6). The bird collected on August 10 and another collected on August 27 were moulting slightly (scattered pin feathers).

Four adult females were collected: two at Cambridge Bay in 1960 during August 10-26; two on Jenny Lind Island in 1962 during June 25-26. Weights and measurements of the four: weight 455 to 580 (515.0), flattened wing 335 to 349 (339.75), tail 196 to 205 (201.25), exposed culmen 30.0 to 33.5 (31.5), bill from anterior edge of nasal fossa to tip 12.5 to 13.5 (12.87), tarsus 46.0 to 48.0 (46.87). The bird collected August 10 was moulting slightly (scattered pin feathers).

One fledged male juvenile (weight 405, flattened wing 273) was collected at Cambridge Bay on August 13, 1962. Colours of the soft parts: bill dark bluish grey with flesh-coloured tinge at base of mandible; tarsi light bluish grey in front, dusky behind; toes bluish grey above; webs dark grey.

Of two downy siblings found at Cambridge Bay in 1962 on July 18 and preserved on July 19, one was a male (weight 91.0, length of primary sheaths 6.0, exposed culmen 15.5, tarsus 28.5) and one a female (weight 57.0, exposed culmen 16.0, tarsus 23.0). The female, by far the smaller of the two, was painted directly from life by Sutton.

Two sets of two eggs each, with nesting material, were collected on Jenny Lind Island in 1962 respectively on June 26 and 30. One hard-shelled egg complete with markings was taken from the oviduct of a female collected on Jenny Lind Island on June 26, 1962.

Annual Breeding Cycle

In early June small numbers of Parasitic Jaegers return to Cambridge Bay where one to three birds together are occasionally seen near the coast feeding chiefly on lemmings. When lemmings are scarce, they feed on other prey; this allows for successful breeding. The relatively few pairs settle in wet tundra. Egg-laying starts in mid-June and continues into late June. Both sexes incubate the usual two eggs for 25 or more days. Hatching occurs in mid-July and late July. Nothing is known of the fledging period, but flying young occur as early as August 13. Both sexes attend young and feign injury. The feigning continues after fledging. Some adults attend young as late as August 26. Others, unemployed, occur at the coast in late August. None has been recorded there after September 1. The species

appears to be uncommon elsewhere in southeastern Victoria Island. On Jenny Lind Island, where the summer schedule is similar to that of Cambridge Bay, it is the commonest of the three jaegers during poor lemming years.

Stercorarius longicaudus Vieillot Long-tailed Jaeger

Long-tailed Jaegers (*Stercorarius longicaudus pallescens*)¹ breed as commonly as Pomarine Jaegers and much more commonly than Parasitic Jaegers in the Cambridge Bay area during lemming peaks. Although breeding pairs are less abundant there during lemming lows, a number apparently nest successfully, living off insects and other prey. On Jenny Lind Island, where scattered pairs breed despite the lack of lemmings some years, it appears to be less abundant than the Parasitic Jaeger.

One flying adult was noted at 68°53' N, 111°30' W, about 25 miles inland from Coronation Gulf west of the Richardson Islands, on August 8, 1960. The species was less abundant than other jaegers at Anderson Bay during August 20–21. At Wellington Bay, a pair with two fledged young was observed one-half mile inland on August 27. Long-tailed Jaegers were about as common there as Parasitic Jaegers, but much less common than Pomarine Jaegers, during August 26–28.

Yearling Long-tailed Jaegers were noted inland (one collected June 27) and along coastal leads (two birds, June 28) on Jenny Lind Island in 1962. None was recorded by us on Victoria Island.

Previous Records

Ellis (1956) noted Long-tailed Jaegers occasionally inland at Cambridge Bay, and also at sea over Queen Maud Gulf in 1954. Fraser (1957) noted the species in southeastern Victoria Island "numerous times" during the summer of 1955: at Wellington Bay on June 13; near Mount Pelly on June 17; near Greiner Lake on July 2; near Ferguson Lake on July 5; "nesting pair" near settlement of Cambridge Bay on June 30.

Arrival

The Long-tailed Jaeger arrived late in southeastern Victoria Island. It was first seen in the Cambridge Bay area in 1960 on June 7 (one bird) and in 1962 on June 10 (flock of three and solitary individual). Paired birds were first noted in 1960 on June 13, and in 1962 on June 11. In both years, the species did not arrive in force before June 15. Large flocks of migrating Long-tailed Jaegers were not seen anywhere in the region.

Nesting

Long-tailed Jaegers occurred in many places in the Cambridge Bay area from the marine beaches to the lower slopes of Mount Pelly. During nesting they were scattered here and there over the tundra, about one pair per two or three square miles in 1960 when lemmings were abundant. For the most

¹Since Loppenthin (1932) described this Nearctic-eastern Siberian race, there has been much disagreement on its validity. Manning (1964) recently examined a large series of specimens and recommended that the race be recognized.

part they occupied the drier tundra, often in fairly high places where vegetation was scant. However, none was found nesting atop the highest ridges, including Mount Pelly. In the lower areas, the species nested on small rocky ridges, knolls, or exposed peaty areas adjacent to wet and marsh tundras. On Jenny Lind Island, the species occupied high, poorly vegetated levels, well above the large lakes and many networks of marshy ponds.

We found little evidence that eggs were laid before June 20. In 1960, at Cambridge Bay on June 25, three sets (one collected) with two eggs each were probably fresh, or nearly so. Also a set of two collected by Waters that day was fresh. Another nest with one egg on June 30 had two eggs on July 1. However, an egg examined in still another nest on July 2 contained a large embryo that may have been two weeks old.

In 1962, a fresh set of two eggs was collected June 27 on Jenny Lind Island. This was the only nest seen by us that year, but, judging by the behaviour of some pairs, other nests were no doubt there (*see* Supplement, p. 226).

Incubation at one nest at Cambridge Bay in 1960 started after the laying of the first egg. Both adults attended the eggs, but no special study was made of their behaviour during the period of incubation. One egg, first seen on June 30, hatched 24 days later on July 24. The other, laid July 1, contained a live embryo 23 days and 21 hours later on July 25, but the chick died before hatching. The period of incubation for the first egg was at least 24 days, perhaps 25 days. The period should be examined closely, since it may be only 23 days (Manniche *in* Salomonsen, 1950-51). The surviving chick was defended fiercely by both parents. It abandoned the nest within a day of hatching.

In 1962, near the outer coast of Cambridge Bay on July 16, a chick thought to be of this species was caught by white persons residing at the settlement. This chick was fairly large (quills 10 mm long), indicating early egg-laying.

A flying juvenile, followed closely by an adult, was first noted in 1960 at Cambridge Bay on August 4. One that was being attended by both adults on the lower slope of Mount Pelly was collected August 4. One of two fledged young, attended by both adults, was collected near Cambridge Bay on August 19. Pairs attending fledged young were recorded as late as August 27 in 1960 (Wellington Bay).

A strong-flying juvenile with two adults was seen over Dease Strait on August 10, 1962.

Departure

Migratory flocks of Long-tailed Jaegers were not observed anywhere by us in late summer or fall of 1960 and 1962. Adults then seen flying over the open seas near the coast were attending young. Our latest date for an adult is September 6 (one bird, Cambridge Bay, 1962). Latest date for a juvenile is August 27 (two siblings, Wellington Bay, 1960).

Prey

The only prey found in Long-tailed Jaeger specimens collected at Cambridge Bay in 1960 was the lemming. Occasionally this species chased longspurs and likely preyed on chicks, but lemmings were the main fare. During

the lemming-low of 1962, these jaegers fed chiefly on insects and what small birds and mammals they could catch. Although we failed to see a lemming anywhere in the Cambridge Bay area that year during May and June, lemming remains showed up in the alimentary canal in each of a pair collected June 13. A pair and a sub-adult collected June 27 on Jenny Lind Island contained insect remains (caterpillars and adult beetles) only.

Long-tailed Jaegers breed commonly and successfully on the almost perennially lemming-poor tundra of west-central Ellesmere Island (Parmelee and MacDonald, 1960). There the birds lay one-egg clutches nearly as often as the usual clutch of two eggs. Whether one-egg clutches occur commonly during lemming-lows in the Victoria Island region is not known. Of twelve nests observed during the lemming peak at Cambridge Bay, the clutch was invariably two eggs. We did not observe enough nests in the period of low lemming abundance to make even a rough comparison of the two seasons. The one nest checked in 1962 held two eggs (Jenny Lind Island, July 27).

Banding

A less than 24-hour-old Long-tailed Jaeger was banded two feet from the nest at Cambridge Bay on July 24, 1960.

Specimens

Three adult male Long-tailed Jaegers were collected: one at Cambridge Bay in 1960 on July 6; two in 1962, respectively at Cambridge Bay on June 13, and on Jenny Lind Island on June 27. Weights (gm) and measurements (mm) of the three: weight 275 to 335 (av. of two 305.0), wing chord 298 to 301 (299.0), flattened wing 305 to 309 (306.66), tail 259 to 312 (287.33), exposed culmen 25.5 to 28.0 (26.66), bill from anterior edge of nasal fossa to tip 12.0 to 13.0 (12.49), tarsus 41.0 to 44.0 (42.33).

Seven adult females were collected: four at Cambridge Bay in 1960 on June 25, July 2, 9, August 24, respectively; two at Cambridge Bay in 1962 on June 13 and August 2, respectively; one on Jenny Lind Island on June 27, 1962. Weights and measurements of the seven: weight 315 to 410 (354.83), wing chord 290 to 315 (306.14), flattened wing 301 to 325 (315.42), tail 282 to 320 (300.85), exposed culmen 26.0 to 30.5 (28.41), bill from nasal fossa 12.0 to 13.5 (12.75), tarsus 42.5 to 47.5 (44.35).

A one-year-old male (wing chord 302, flattened wing 312, tail 242, exposed culmen 29.0, tarsus 45.5) was collected on Jenny Lind Island on June 27, 1962.

Two fledged birds of the year were collected at Cambridge Bay in 1960: one male (weight 315, wing chord 220, tail 93.0) on August 11; one female (weight 440, wing chord 277, tail 130) on August 19. Down was conspicuous on forehead, throat, and over most of the ventral side of the younger specimen, but it was not obvious anywhere on the older one.

One pipped egg collected at Cambridge Bay on July 26, 1960, was preserved in alcohol.

Two sets of two eggs each, with nest linings, were collected: one at Cambridge Bay in 1960 on June 25; one on Jenny Lind Island in 1962 on June 27.

Annual Breeding Cycle

Although a few Long-tailed Jaegers appear in southeastern Victoria Island in early June, the majority arrive in mid-June. The first birds seen are solitary or in small flocks. Pairs are common in mid-June. The nesting habitat is variable; it may be at low or high levels but is essentially dry. Egg-laying by a few pairs may start in mid-June. Most eggs are probably laid after June 20. Laying continues into early July, but most clutches are probably completed by then. When lemmings are abundant, the clutch size is two; whether one-egg clutches occur commonly when lemmings are scarce is uncertain. Incubation by both adults may start before the laying of the second egg. The period of incubation is not precisely known but may be 23 to 25 days. Hatching commences in mid-July, probably earlier, and continues into late July. Young may abandon the nest within a day of hatching. The two sexes defend small and large young fiercely. Some young fledge in early August, many probably in mid-August. The flying juveniles are attended by both adults inland or over the open coastal waters as late as August 28. Some adults, and likely juveniles, remain into September, but the species is not common then. The nesting routine appears to be similar on Jenny Lind Island. In both areas the species is not very sensitive to the lemming cycle, though the nesting population may be less dense during lemming lows. A few yearling birds visit the region during summer, but there is no evidence that they breed.

Larus hyperboreus Gunnerus - Glaucous Gull

Glaucous Gulls are widely distributed in southeastern Victoria Island where many pairs breed singly or in small colonies at the fresh waters. A few pairs nest on certain sea cliffs, notably those of the Finlayson and Richardson islands. They are conspicuous on Jenny Lind Island where scattered pairs breed on the low, rocky coasts as well as inland at lakes and ponds (*see* Supplement, p. 226). The birds of these regions are large-billed and referable to the nominate race *Larus hyperboreus hyperboreus*.

Barry noted Glaucous Gulls all the way from Cambridge Bay to the north coast where, at Hadley Bay, he recorded 46 birds on August 9, 1960.

Previous Records

Collinson (1889) mentions the collecting of "above 50 gull eggs" on the Finlayson Islands in July of 1853; almost certainly some of those eggs were from Glaucous Gulls. Two Glaucous Gull eggs (in British Museum) were collected in the Cambridge Bay area in 1853 by members of H.M.S. *Enterprise* under Collinson (Oates, 1901). An adult was collected by Captain Joseph Bernard at De Haven Point on August 24 in either 1918 or 1919. Ellis (1956) noted many Glaucous Gulls at sea between Coppermine and Cambridge Bay in 1954; he stated that breeding birds were scattered over the tundra near Cambridge Bay and that others were "mixed" with "*Larus argentatus*" at a cliff on one of the Finlayson Islands. The common gull observed "throughout" southeastern Victoria Island in 1955 by Fraser (1957) was the Glaucous Gull.

Arrival

Having missed the early arrival in 1960, we especially looked for Glaucous Gulls at Cambridge Bay in 1962. The first two seen that year rested in a frozen river-bed one-half mile from the head of the bay on May 23. The following day a flock of 72 rested on frozen Cambridge Bay, and likely these same birds were the ones seen there on days following. By May 30 another flock of 50 birds appeared, and the total of 122 birds was our largest single count. Glaucous Gulls occur as early as May 13 on floes near Banks Island (Manning, *et al.*, 1956).

Both sexes probably arrived at the same time, but we failed to collect specimens early enough to prove the point. The first females were secured May 26, the first males on May 30. Glaucous Gulls flew in pairs commonly after May 25. The paired birds often showed an obvious sexual dimorphism with respect to size.

Paired or not, the gulls commonly flocked with lesser numbers of Thayer's Gulls in late May and early June. At Cambridge Bay they could be found at almost any hour far out on the sea ice or more commonly at the DEW-Line Station dump, where they picked at garbage. The flocks also rested on fresh-water ice, within a half mile of the bay at first; but soon singles, pairs, and small flocks flying back and forth between the bay and remote areas inland became a familiar sight.

The early arriving gulls were exceedingly shy and difficult to approach. Most calls heard from them were wails and the well known *klee-o*. The first definite change of attitude was noted May 31 at the feeding areas near the bay when some adults circled low overhead and called *cak-cak-cak* or *cuk-cuk-cuk*, which are characteristic calls near the nest. These birds did not nest in these particular areas, however. Neither courtship nor copulation was observed during this early period.

About 50 Glaucous and 25 Thayer's gulls flew out from the nesting cliff and circled about together over the frozen sea as we approached the Finlayson Islands gullery on June 3, 1962. All the nesting ledges were covered with snow then, and there were no shore leads. Despite the wintry conditions there was much activity. At a cliff occupied by Glaucous Gulls in the Cape Dorset area of Baffin Island, the first indication of attachment to nesting sites was observed on May 27 (Macpherson, 1961).

Nesting

In carefully checking the Finlayson Islands gullery on June 21, 1960, we found a total of fourteen Glaucous Gull nests. These, for the most part, were to one side and above a more concentrated and somewhat larger colony of Thayer's Gulls that nested on a more precipitous face of the cliff. The colony was not 'mixed' in a true sense, for the two species remained distinctly apart. When provoked into leaving the nests or perches, both Glaucous and Thayer's gulls flew together overhead, giving the illusion that the two species mixed indiscriminately.

The Glaucous Gull nests were large, bowl-shaped structures, composed mostly of turf and moss that grew profusely on the well-fertilized ledges close

by. They were lined with debris and a few feathers. All these nests were on rather broad ledges a hundred feet or so above the sea, and all without exception were easily reached. Of the fourteen nests, eleven had three eggs each, two had two eggs each, and one held a single fresh egg. Four sets of three eggs each, collected that day, disclosed the fact that incubation in all four sets had started with the first egg, each of which contained a small embryo not incubated more than five or six days. Egg-laying had taken place in mid-June, and the clutches probably were complete in most nests by June 20. The smaller clutches may not yet have been complete. Allowing 28 days for incubation (*see* Witherby, *et al.*, 1958), some Glaucous Gulls at this gullery would have hatched about July 13 that year.

Few, if any, young were produced at this gullery in 1962. When Sutton and Stephens visited the cliff on August 10, the only gulls of any age seen were Thayer's Gulls. Eskimos who occasionally raid the gullery for eggs may have broken up the more accessible Glaucous Gull nests. Perhaps as many as fifty of these gulls were at the cliff earlier that year.

Another sea-cliff gullery (approximately 68°33' N, 110°26' W) was on one of the Richardson Islands. Glaucous and Thayer's gulls were present in what appeared to be the same numbers as at the Finlayson Islands gullery. While flying by the cliff on August 8, 1960, we failed to make an accurate count. Whether Glaucous Gulls ever breed on cliffs in southeastern Victoria Island is not known. A few adults protested from the high cliffs at the head of Anderson Bay during August 20-21, 1960, but neither nests nor young were actually observed there.

Inland from Cambridge Bay the gulls nested at the fresh waters, exclusively on islands or peninsulas in lakes.¹ On Jenny Lind Island where large lakes were scarce, the gulls nested on islets or sedgy banks in marsh tundra where there were networks of ponds. All these nests were similar to those situated on cliffs, except that they were often larger. They were conspicuous even at great distances. Some must have been used many years.

Many pairs nesting inland were solitary, but several pairs often occupied the larger lakes. Waters reported finding a colony with "at least 20 nests" on an island in a large lake southeast of Mount Pelly on July 5, 1960. This was the largest colony known to us. On Jenny Lind Island, two pairs per square mile of marsh tundra seemed optimal.

Egg-laying may have averaged somewhat earlier inland than at the sea cliffs, but no doubt the thaw at both places is an important factor. A setting Glaucous Gull was noted in the Mount Pelly area as early as June 13 in 1962 (nest was not checked at time). The first chick at a nest near Mount Pelly in 1960 hatched as early as July 9, indicating egg-laying about June 11. The second sibling of this nest hatched on July 10, at which time the third and last egg was pipped. The male parent regularly flew at least eight miles to Cambridge Bay to feed. Since it lacked certain flight feathers, we knew it was the same individual each time. It may be rightly assumed that the many other Glaucous Gulls seen flying between the inland lake areas and the coast

¹Lake nesting by the species, uncommon in the Eastern Arctic, is fairly typical of southeastern Victoria and Jenny Lind islands and apparently of other islands of the Western Arctic where the Herring Gull (*Larus argentatus smithsonianus*) does not breed.

were breeding adults. These flights continued throughout the incubation and fledging periods.

Both sexes attended young. The chicks left the nest soon after hatching but remained in the breeding places until fledging. Flightless young were noted as late as August 20 (Cambridge Bay, 1962), flying young as early as August 26 (Wellington Bay, 1960). Many Glaucous Gulls were in the Cambridge Bay area in early September of 1962. Adults, especially, congregated at the DEW-Line Station dump; at least a hundred of them flocked there on the 7th. Strong-flying young defended fiercely by adults were still present when Sutton and Stephens left the region on September 12.

Banding

One adult was trapped and banded near the beach within the settlement of Cambridge Bay on July 29, 1960. Three adults were trapped there and banded in 1962; one on August 29, two on September 2.

Specimens

Four adult male Glaucous Gulls were collected at Cambridge Bay: one on July 10 in 1960 and three on May 30 in 1962. Weights (gm) and measurements (mm) of the four: weight 1,765 to 2,125 (1,930.0), wingspread of one bird 1,606, flattened wing 462 to 477 (468), tail 195 to 198 (196.0), exposed culmen 58.0 to 65.0 (62.25), depth of bill¹ 20.3 to 22.2 (av. of three birds 21.3), width of bill¹ 14.2 to 15.9 (av. of three birds 14.9), tarsus 74.5 to 79.0 (76.62).

Five adult females were collected: two on the Finlayson Islands in 1960 during June 20–21, and three at Cambridge Bay in 1962 during May 26–30. Weights and measurements of the five: weight 1,375 to 1,525 (1,482.0), wingspread 1,425 to 1,530 (av. of three birds 1,463.8), flattened wing 434 to 462 (446.4), tail 179 to 191 (185.8), exposed culmen 52.5 to 59.0 (54.5), depth of bill 17.1 to 19.1 (av. of four birds 18.07), width of bill 12.4 to 13.9 (av. of four birds 13.3), tarsus 67.0 to 74.5 (69.5).

One adult of uncertain sex (weight 1,900, flattened wing 465, tail 193, exposed culmen 62.5, tarsus 74.0) was collected at Cambridge Bay on June 11, 1960. The large size indicates that it is a male.

One fledged male juvenile (weight 1,780, total length from bill tip to tail tip 692, wingspread 1,501, flattened wing 427, tail 184, exposed culmen 56.0, depth of bill 19.0, width of bill 12.8, tarsus 74.0) was collected at Cambridge Bay on September 6, 1962. Colours of soft parts: eyes dark brown; eyelids brownish flesh colour; bill pale pinkish flesh colour with dusky tip; legs and feet pale pinkish flesh colour.

One 12-hour-old downy female (weight 68.0, exposed culmen 19.0, tarsus 23.0) was collected at Cambridge Bay on July 10, 1960.

Four sets of three eggs each were collected at the Finlayson Islands gullery on June 21, 1960.

¹Measured at distal end of lateral feathering.

Annual Breeding Cycle

Glaucous Gulls return to southeastern Victoria Island in late May, well before the thaw. Although pairs are noticeable at this time, all these gulls congregate in mixed flocks with lesser numbers of Thayer's Gulls. They mostly rest on the sea ice or frozen lakes near by. Most Glaucous Gulls arrive by June 1, when some of them begin to advertise an interest in breeding. Their flights between the coast and inland breeding areas are soon conspicuous, and the flights continue throughout nesting. The usual habitat is lake tundra well back from the coast. Solitary pairs nest abundantly on islands or peninsulas in lakes, several pairs not infrequently occupying the larger lakes. Twenty pairs may nest on a single island, but such concentrations are unusual. Pairs also congregate with Thayer's Gulls at sea cliffs as early as June 3 when the nesting ledges are still under snow. At the cliffs the two species segregate. Egg-laying probably starts as early as June 11; during years of normal thaw it culminates before June 20. The clutch size is three eggs, two occasionally. Incubation starts with the first egg. Young hatch inland as early as July 9. Attended by both parents, they remain in the nesting areas until fledged. Flying young occur on the Victoria Island coast as early as August 26. They are common there in late August and early September. Some are attended by adults into mid-September. It is not known when the species leaves the region. Presumably a few local juveniles remain until the seas freeze over.

Larus argentatus Pontoppidan Herring Gull

Herring Gulls were not recorded by us in 1960 and 1962. At least two were seen among roosting Glaucous and Thayer's gulls near the DEW-Line Station on Jenny Lind Island in late July of 1966.

Specimens

A female Herring Gull (*Larus argentatus smithsonianus*) was collected by Sutton on Jenny Lind Island on July 27, 1966. According to George E. Watson (pers. comm.), a dark subterminal smudge on the central rectrices and dark shaft markings on the alular quills indicate that the bird was not quite in definitive plumage.

Larus thayeri Brooks Thayer's Gull

Moderate numbers of Thayer's Gulls breed on sea cliffs of the Richardson and Finlayson islands. Although a regular visitor to the southeast coast of Victoria Island near by, the species is not known to breed on sea cliffs nor anywhere inland there. Thayer's Gulls visit but apparently do not breed on Jenny Lind Island where there are no high cliffs (see Supplement, p. 227).

Previous Records

Gull eggs collected on the Finlayson Islands in July of 1853 (Collinson, 1889) almost certainly included those of Thayer's Gull. In all probability the three Iceland Gull (*Larus glaucoides*) eggs in the British Museum that were



June 21, 1960. The whitish birds on the bold front of the Finlayson Islands sea cliff are Thayer's Gulls. Not visible are Glaucous Gulls which nested on higher rocks. Below the gulls were hidden nests of a pair of Common Ravens and a pair of Snow Buntings. Note the deep crack or lead in the ice that locked the shore at this late date. Victoria Island lies on the horizon.



June 21, 1960. Thayer's Gull near its nest and nearly fresh eggs at the Finlayson Islands gullery. Many Thayer's and Glaucous gulls are at the breeding cliffs as early as June 3 when the nesting ledges are covered with snow. Note sea ice at base of cliff.

collected in the Cambridge Bay area in 1853 by members of H.M.S. *Enterprise* under Collinson (Oates, 1901; Bent, 1921) are from Thayer's Gulls. Ellis (1956) noted Thayer's Gulls at the Finlayson Islands gullery in 1954; he noted adults and immatures at Cambridge Bay as well.

No doubt Thayer's Gulls were encountered in southeastern Victoria Island by Porsild (1951) and Fraser (1957), but the birds were not distinguished from the more abundant Glaucous Gulls. According to Anderson (1913), a number of "California Gulls" nested with Glaucous Gulls on shelves of rock in Duke of York Archipelago, Coronation Gulf; these birds were Thayer's Gulls.

Arrival

Two Thayer's Gulls, flocked with 50 Glaucous Gulls on the sea ice several hundred yards offshore from the Cambridge Bay settlement during May 26-30, were the first of their kind noted by us in 1962. As many as 30 Thayer's Gulls flocked with numerous Glaucous Gulls on May 31. Four subadult Thayer's Gulls appeared on June 1. Thereafter, adults and subadults were familiar birds of Cambridge Bay throughout the summer months. As in 1960, they flew back and forth along the bay shore, occasionally circling in low over the settlement, sometimes alighting. They fed extensively on the artificial food supply at the village and DEW-Line Station dumps. Not infrequently they flew inland towards Greiner Lake, following the river as they went and returning by the same route. Presumably they fed at the big lake. We knew of no gullery inland; if one existed there, it must have been somewhere in the remote interior.

About 25 Thayer's and 50 Glaucous gulls were at the Finlayson Islands gullery at the time of our brief visit there on June 3 in 1962. The birds flew out from the snow-covered ledges as we approached, later returning to the cliff.

Nesting

Nineteen pairs of Thayer's Gulls nested at the Finlayson Islands gullery in 1960. All nineteen nests were clustered on the most precipitous face of the cliff. To one side and above this colony, but clearly apart from it, were fourteen Glaucous Gull nests that were more scattered and less protected. A pair of ravens nested below these many gulls.

Nests of Thayer's Gulls, somewhat smaller but otherwise similar to those of the Glaucous Gull, were bowl-shaped, composed mostly of turf and lined thinly with grasses and feathers. The nests were on narrow ledges or in niches. Some were only a few feet apart. The smaller females were seen most abundantly at the nest during our brief visit, but the males were there also. Males shot at the colony had well-developed brood patches.

On June 21, fifteen of the nests held three eggs each, three held two eggs each, and one held a single fresh egg. Of six sets collected that day, the three eggs of each contained small embryos of different ages, indicating that incubation had started with the first egg. Each set contained an egg with an embryo estimated to have been five or six days old. Egg-laying apparently had started at this colony about June 15—about the time it had started with the Glaucous Gulls nesting close by.

The period of incubation for Thayer's Gull is not known. Assuming 26 days, the average period for *Larus argentatus argentatus* (Lockley, in Witherby, *et al.*, 1958), some Thayer's Gulls at this gullery would have hatched about July 12 that year.

The Finlayson Islands gullery was not visited during July of either year; but in 1962 Sutton and Stephens visited the cliff on August 10, finding 41 Thayer's Gulls, a figure close to our 1960 count of 19 pairs. The large but very downy chicks huddled on the ledges and in cracks did not attempt to leap when chased. Most were inaccessible, however. All appeared to be of a similar age. All that were captured had small remiges that were completely sheathed. The chicks (*see* Specimens below) seemed small for the date, suggesting that egg-laying may have been later than in 1960. Late-thawing snow on the ledges likely precludes early nesting.

Thayer's Gulls defending their nests made quite a commotion overhead but did not dive in very close. They differed from the bolder Glaucous Gulls in this respect.

The only other Thayer's Gull colony recorded was on the Richardson Islands at approximately 68°33' N, 110°26' W. It appeared to be similar in size to that of the Finlayson Islands. Glaucous Gulls were there also, but we failed to make an accurate count of both species while flying by the colony on August 8, 1960.

We kept a sharp lookout for flying juveniles, and the first one seen in 1960 was near the outer coast of Anderson Bay on August 21. This is an early but reasonable date. Assuming that the fledging period is about six weeks, as apparently it is in *Larus argentatus* (Heinroth in Witherby, *et al.*, *ibid.*), young hatching about July 12 would be flying by August 23 or thereabout.

Flying juveniles next seen were near the settlement of Cambridge Bay on August 26 (two birds). During August 29-30, many were flying along the bay shore. One or two juveniles flying apart from the flocks were attended by one adult only, but whether this was invariably the case was not determined.

Flying juveniles were first seen at Cambridge Bay by Sutton and Stephens on September 1 (three widely separated birds). At least ten juveniles were seen flying at one time on September 3. Whether these birds were still being attended was difficult to determine. Adult, subadult, and young of the year were conspicuous at Cambridge Bay when Sutton and Stephens departed from there on September 12.

Adult and subadult Thayer's Gulls undergo extensive moult during the summer months. Replacement of primaries is obvious in August specimens, but it is not completed by September.

Mortality

Cambridge Bay Eskimos shoot Thayer's and other gull species for food whenever they can be had conveniently. They occasionally raid the Finlayson Islands gullery and no doubt carry off most of the Glaucous Gull eggs and probably a fair number of Thayer's Gull eggs. The inaccessibility of some Thayer's Gull nests probably ensures survival of the colony. The problem is not acute for the Glaucous Gulls, since the large majority of them scatter widely over the lake tundra during nesting.

Banding

The following adult Thayer's Gulls were live-trapped within the settlement of Cambridge Bay in 1960 and banded: one on July 29, one on August 12, one on August 24, one on August 28, two on August 29.

The following adults were banded there by Sutton and Stephens in 1962: two on August 26, one (667-81908) on August 27, two on August 28, one on August 31, one on September 1, one on September 3, and one on September 4.

One of the Thayer's Gulls banded in 1962 was shot by an Eskimo at Cambridge Bay on September 5, eight days following banding.

Thayer's Gull 667-81908 was observed by R. F. Oldaker at Vancouver, British Columbia, 58 days following banding. The bird was noted several times at the Vancouver City Dump from October 24 through November 6, when observations were discontinued. Remarkably enough, Oldaker read the band number with a telescope, a technique he has perfected (Houston, 1963).¹

Captive Thayer's Gulls

Five Thayer's Gulls were captured at the Finlayson Islands gullery on August 10, 1962, by Sutton and Stephens, who raised the five to fledging stage. The birds were later transported to the United States where they now thrive in the flight pen at Great Bend, Kansas. Brit Spaugh, Superintendent of the Zoological Park in Great Bend, is caring for the birds. Observations on feather and colour development are being made by the authors and will be reported at a later date.

Specimens

Five adult male Thayer's Gulls were collected: four at the Finlayson Islands gullery, three on June 21 in 1960 and one on August 10 in 1962; one at Cambridge Bay on August 1, 1962. Weights (gm) and measurements (mm) of the five: weight 940 to 1,100 (1,021.0), flattened wing 420 to 448 (431.8), tail 167 to 176 (171.2), exposed culmen 49.5 to 53.5 (52.2), bill from anterior edge of nasal fossa to tip 23.0 to 27.0 (24.8), tarsus 64.5 to 69.0 (66.0).

Three adult females were collected: one at Cambridge Bay on June 7, 1960; two at the Finlayson Islands gullery, one on June 21 in 1960 and one on August 10 in 1962. Weights and measurements of the three: weight 820 to 900 (870.0), flattened wing 402 to 421 (408.66), tail 163 to 164 (163.33), exposed culmen 48.0 to 50.5 (49.5), bill from anterior edge of nasal fossa to tip 22.0 to 24.5 (23.6), tarsus 59.0 to 62.0 (60.66).

Nine subadult Thayer's Gulls of various ages were collected at Cambridge Bay. Of five males, two were collected in 1960 respectively on August 17 and 24, and three in 1962 on June 1, July 5, and August 27 respectively. Of four females, two were collected in 1960 respectively on July 31 and August 12, and two in 1962 respectively on June 18 and July 5. The plumages, colours, and moults of these subadult birds with respect to age groups

¹According to Mr. Oldaker (pers. comm.), the first Thayer's Gulls arrive at Vancouver in mid-September (September 12-17 recorded for a five-year period). The gulls increase in number daily until by the end of October they are quite plentiful; many remain to winter in the Vancouver area. Thayer's Gulls are still quite plentiful in March, but usually all are gone before the end of April.

will be discussed in a later publication following studies on live (captive) birds now in progress.

Two fledged male juveniles (weight 905 to 920, total length from bill tip to tail tip 575 to 592, wingspread 1,300 to 1,356, flattened wing 402 to 407, tail 165 to 168, exposed culmen 44.5 to 46.5, bill from anterior edge of nasal fossa to tip 20.0 to 22.0, tarsus 63.0 to 65.0) were collected at Cambridge Bay in 1962 on September 6 and 7 respectively. Colours of soft parts: irides dark brown; eyelids brownish flesh colour; legs and feet greyish brown with pinkish tinge.

Two large downy females (weight 225 to 280, exposed culmen 23.0 to 28.0, tarsus 37.5 to 39.0) were taken from the Finlayson Islands gullery in 1962 on August 10 and preserved on August 11. Primary sheaths were visible. Colours of soft parts: irides dark brown, nearly black, eyelids dull grey; bill dusky grey with pale brownish tip; legs and feet dull greyish brown.

Six sets of three eggs each were collected at the Finlayson Islands gullery on June 21, 1960. The eighteen eggs measure: length 62.4 to 76.2 (69.64), width 44.1 to 50.6 (47.6). Eggs of Thayer's Gulls also vary greatly in colour. The ground colour ranges from very pale grey to nearly buffy brown or light sepia. The underlying spots and blotches are lavender or grey; the overlying ones are of various shades of dark brown. Some eggs are boldly marked with streaks or scrawls.

Annual Breeding Cycle

A few adult Thayer's Gulls are to be found in late May among the more numerous Glaucous Gulls that flock on the sea ice of Cambridge Bay or the frozen lakes near by. Most adults arrive by June 1, followed by smaller numbers of subadult birds of various ages that summer and moult in the region. Although the species is conspicuous during summer on the coast of southeastern Victoria Island, it is known to breed only at precipitous sea cliffs on adjacent small islands. These gulleries are occupied as early as June 3, when solid ice locks the base of the cliff and snow covers the nesting ledges. About equal numbers of Glaucous Gulls occupy the same cliff, but the two species nest apart from one another. Probably most eggs are laid in mid-June during years of normal thaw. The clutch size is three, occasionally two. Incubation begins with the first egg. Both sexes incubate, but nothing is known of the incubation or fledging periods. Presumably the young remain on the narrow nesting ledges until fledging in late August. Flying juveniles appear on the Victoria Island coast as early as August 21, but they are not conspicuous there until the very last days of August. Thayer's Gulls of all ages are still conspicuous in mid-September. Cambridge Bay birds, many of them probably from the Finlayson Islands gullery, winter on the Pacific Coast as far south as Vancouver, British Columbia, some adults arriving there by October 24.

Xema sabini (Sabine) Sabine's Gull

Sabine's Gull (*Xema sabini sabini*) breeds abundantly in the Cambridge Bay area and probably throughout southeastern Victoria Island where it was noted frequently at coastal and inland waters during the 1960 waterfowl



June 26, 1962. Incubating Sabine's Gull in marsh tundra on Jenny Lind Island. Isolated pairs and small colonies of these gulls were scattered near the beaches and inland throughout the low tundra. The species was equally common in southeastern Victoria Island.

survey flights of August 7-9. The largest numbers seen were in the Wellington Bay area (estimated 700 birds). The species would appear to be widely distributed in eastern Victoria Island, for Barry noted it all the way from Cambridge Bay to Hadley Bay (500 birds) on the north coast. It is a fairly common breeder on Jenny Lind Island.

Previous Records

According to Preble (1908), an egg of Sabine's Gull was collected at Cambridge Bay in 1853 by members of H.M.S. *Enterprise* under Collinson. In the National Museum of Canada there is a large juvenile that was collected on Taylor Island by Captain Joseph Bernard on August 22, 1917. Bernard (1925) stated that Sabine's Gulls were "very numerous" during 1918-1919 on Taylor Island where they probably bred. Ellis (1956) stated that a "colony of about 200 birds" was scattered over ponds near Cambridge Bay in 1954, and that "downy young" were seen there from August 8-18. Fraser (1957) noted the species in 1955 at Ferguson Lake on June 16 and near Mount Pelly on June 17.

Arrival

Sabine's Gulls were first noted in 1960 on June 6—two solitary birds circling over partly thawed ponds near Cambridge Bay. The following day two solitary individuals flew near the bay, and not far from there a flock of five rested on a frozen lake. Two Sabine's Gulls, behaving as a pair, flew fiercely at a Snowy Owl on June 8, a sight that was common on days following. These gulls gradually became more numerous, and by June 13 they were abundant along the coast, within the settlement of Cambridge Bay, and inland at the fresh waters.

Sabine's Gull was first noted in 1962 on June 6 also. That day a solitary female collected at a frozen lake about four miles inland from Cambridge Bay had eaten small beetles. As in 1960, there was a gradual increase of these gulls, and by June 13 they were abundant.

Nesting

In mid-June of 1960 and 1962, paired Sabine's Gulls, many with a distinct rosy cast to their breasts, defended certain marshy spots near Cambridge Bay. Some pairs flew boldly at us, suggesting the presence of eggs, but the only nest found then was a fresh scrape. On June 17, 1962, we watched a Sabine's Gull vigorously kick peat out of this scrape, which later was abandoned.

Courtship was not observed in detail. We noted only playful flights, some chasing, and pairs on the ground with lowered heads and puffed-out plumage. On June 16, 1962, two swimming birds faced each other with heads lowered in the water nearly to their eyes. This was followed by a mutual display of their wide-open, vermilion-red mouths. Whether displays of this sort were concerned with courtship or with territorial dispute was not determined.

Our earliest date for Sabine's Gull eggs in the Cambridge Bay area in 1960 was June 23 (two eggs, incomplete clutch). That year Waters found several

sets with complete clutches on June 24. Most of these eggs were fresh or nearly so, but one set had been incubated "about a week," clearly indicating that egg-laying had started in mid-June.

It is difficult to estimate the number of Sabine's Gulls that bred in the Cambridge Bay area in 1960. Many pairs scattered thinly over the tundra from near the coast to at least twelve miles inland. A solitary pair at a pond or lake was not unusual, but more often two or three pairs occupied a small lake or part of a larger lake. Small colonies existed where several pairs nested close together, the nests in some cases being only a few feet apart. The largest concentration seen was of fourteen pairs which nested on three small islands at one end of a shallow, mile-long lake. Six pairs occupied the other end of the lake. We visited this lake in 1962 on June 5, finding solid ice everywhere and no gulls. By June 13 the lake was wide open, and there were a few gulls, some displaying.

This scattering of pairs and small colonies was by no means even. Vast stretches of tundra about Cambridge Bay had few or no Sabine's Gulls. The land seemingly could have supported many more of them, for much of the tundra was wet and suited to the species. Despite these obvious gaps, the birds were seen daily in so many places that they can be listed only as common and familiar birds of the region. Ellis's (*ibid.*) estimate of 200 Sabine's Gulls for Cambridge Bay in 1954 is below that of 1960, when at least that many resided on the tundra between Cambridge Bay and Mount Pelly alone, not taking into account the land elsewhere. The species appeared to be somewhat less abundant in 1962.

The nesting sites near Cambridge Bay varied but generally were of three types. Most often the nests were on islands in ponds or lakes, some of which were deep. Not infrequently they were on points of land or broad peninsulas extending out from shore. Less often they were in wet or marsh tundra well back from the shore, in one case 40 paces from water. On Jenny Lind Island the nesting ground was essentially marsh tundra with networks of shallow ponds. Here, scattered pairs of Sabine's Gulls commonly built their nests in the tops of hummocks that stood in little pools of water. Most interesting was the fact that some of them nested in turf bordering the marine beaches just above high tide.

Other species, notably Yellow-billed and Arctic loons, Black Brant, and Arctic Terns, frequently nested where pairs of Sabine's Gulls also nested, the eggs of two or more species in some cases being within a few feet of each other. Of all these birds, the Arctic Tern was seen most frequently inland with the gulls; the two species often, but not invariably, occupied the same nesting areas at Cambridge Bay.

Not all nests seen were visited, but nearly forty of them, including those of Jenny Lind Island, were carefully checked. All were scrapes, both shallow and deep in grass, moss, or peat, usually lined with dry grasses, and dry or fresh willow twigs that had been pulled up by the roots or broken off. Some were lined with dry and fresh leaves of willow and other plants. All these many materials had been placed carefully in the cup. Moss as a lining was not conspicuous except in old scrapes overgrown with it. Some old scrapes were not lined afresh, and even a few fresh scrapes went unlined, the eggs resting on bare peat. The ground all about these nests was invariably wet.

Twenty-four nests held three eggs each, and nine others held two eggs each. In only a single known case was the clutch size one egg. There were two eggs in each of four additional nests and one egg in still another, but it was not determined whether additional eggs were laid in those nests. The ratio of three-egg clutches appeared to be more than twice as great as two-egg clutches. This is contrary to Snyder (1957) who states that the species in Canada usually lays "two eggs, sometimes three."

In watching a solitary pair, we soon concluded that one of the pair was often away. Both sexes shared in incubation, and the incubating bird often flew off on being relieved. Some of these nesting birds probably flew to the coast where the species fed in shore leads and later in the open sea.

Defence of the nest was by aerial attack, call, and defecation. After several minutes of intense activity, the Sabine's Gull behaved peculiarly. Standing squarely on the ground, it leaned forward with folded wings held out from the body, its stretched neck parallel to the ground. It then slowly tipped its bill upward, as though choking, but did not regurgitate. After a moment it resumed flying. More often than not, it repeated this act of distress. The two sexes behaved thus, sometimes simultaneously when both were present.

The period of incubation for the last egg of a three-egg clutch at one nest was ascertained to be 21 days and six hours (error not greater than 14 hours).

Observations at several nests, and also of embryos in eggs that were collected, indicated that eggs were laid on consecutive days and that incubation started with the first egg. Young hatched on consecutive days. At one nest the first young (hatched July 13) left the nest before the second sibling hatched (July 14). By the time the third sibling hatched (July 15), the second was six feet from the nest and ran when touched. At no nest did we find more than one chick at a time. Chicks of various ages hid under vegetation, in cracks in the ground, often at the edge of water. When chased even the very small chicks swam out from shore (*see* Supplement, p. 227).

Unexpected late nestings were noted at a colony first visited by us on July 2 in 1960. Three nests with eggs were found there as late as July 19. One set of two (collected) contained very small embryos. Another set appeared to be fairly fresh also, for the two eggs sank when placed in water. Still another nest had a single fresh egg. Inasmuch as four sets had been collected there earlier by Waters, and still another by us, these late nestings may have been second attempts rather than first layings. Whatever the case, it is a remarkable fact that a fresh egg was being incubated as late as July 19—only 11 days before some Sabine's Gulls fledged that year!

Flying juveniles occurred as early as July 30 in 1960, when two (one collected) were noted several miles inland from Cambridge Bay. They were first noted there on July 31 in 1962, when one was collected by Stephens. These fledged young were attended by adults, presumably parent birds.

Departure

In 1960, adult and young Sabine's Gulls were common inland near Cambridge Bay until August 16 but scarce thereafter, and none was seen inland after the 19th. Likewise they were scarce inland after the middle of August

in 1962. That year an adult was the last seen inland on August 23. Juveniles were last seen inland on August 24 (two birds).

Juveniles at the coastal waters were first noted in 1960 on August 13 (three birds). From then on they were seen there regularly with adults until August 27—our latest date for Sabine's Gulls of any age. The only large flock noted at any time was at Anderson Bay where twenty juveniles and several adults fed at sea a half mile from shore on August 21.

In 1962, the species was not observed anywhere in the Cambridge Bay region after August 24. According to Snyder (*ibid.*), departure of Sabine's Gulls from the Canadian Arctic occurs chiefly in September, occasionally October; also, the Canadian Arctic population, excepting the easternmost segment, migrates to the Bering Sea and the Pacific. If this is true, Victoria Island and Jenny Lind Island birds probably winter off the west coast of South America (*see* Mayaud, 1961).

Mortality

An adult female Peregrine Falcon collected near its eyrie at Anderson Bay on August 21, 1960, had eaten a Sabine's Gull fledgling. Numerous remains of adult Sabine's Gulls were scattered about the cliff.

Banding

Six adult Sabine's Gulls, caught in padded fox traps placed near food scraps within the settlement of Cambridge Bay, were banded in 1960: two on July 29, and four on August 12. Inland near Cambridge Bay the following were banded in 1960: three large chicks on July 19, two fairly small chicks on July 19, and three newly hatched chicks respectively on July 14, 15, and 19.

Specimens

Seven adult male Sabine's Gulls were collected at Cambridge Bay: two on June 11 and two respectively on August 6 and 12 in 1960; in 1962, three respectively on June 13, 16, July 30. Weights (gm) and measurements (mm) of the seven: weight 181 to 210 (196.42), flattened wing 270 to 287 (279.28), tail 117 to 130 (124.14), exposed culmen 25.0 to 28.0 (av. of five birds 26.1), tarsus 34.0 to 37.0 (35.42).

Four adult females were collected: three at Cambridge Bay, one in 1960 on August 6 and two in 1962 respectively on June 6 and 16; one on Jenny Lind Island on June 23, 1962. Weights and measurements of the four: weight 162 to 211 (185.75), flattened wing 272 to 276 (274.0), tail 110 to 123 (114.5), exposed culmen 23.0 to 26.0 (24.0), tarsus 32.5 to 36.5 (34.0).

Two fledged male juveniles (weight 195 to 196, flattened wing 207 to 231) were collected at Cambridge Bay respectively on August 6, 1960, and July 31, 1962. Flight feathers were sheathed at base. Down was conspicuous at base of bill, forehead, pectoral region, and thighs. Colours of soft parts were: irides dark brown; mouth lining pale orange to flesh colour; bill light brownish grey, basal half of mandible somewhat pinkish or flesh-coloured; legs and feet pale flesh to greyish flesh colour.

One fledged female juvenile (weight 195, flattened wing 207) was collected at Cambridge Bay on July 30, 1960. Flight feathers were sheathed at base. Down was conspicuous at base of bill, throat, pectoral region, thighs, and rump.

Two large flightless female juveniles (weight 176 to 224, wing chord 135 to 162) were collected at Cambridge Bay on July 30, 1960. Down was extensive over entire body.

Four downy females were collected near Cambridge Bay, two in 1960 respectively on July 11 and 19, and two on July 16, 1962. The newly hatched chick weighed about 13.0 gm; its culmen was about 9.0 mm, its tarsus about 17 mm. Colours of soft parts of the 1962 specimens: bill pinkish flesh colour with light brown tip; legs and feet pinkish to greyish flesh colour.

One pipped egg was collected at Cambridge Bay on July 11, 1960, and preserved in alcohol.

Seven sets with nesting material were collected: two of three eggs each and one of two eggs near Cambridge Bay in 1960 respectively on July 2, 2, 19; four of three eggs each on Jenny Lind Island in 1962 respectively on June 28, 29, 30, July 5.

Annual Breeding Cycle

The first Sabine's Gulls return to southeastern Victoria Island by June 6. Most Sabine's Gulls arrive in mid-June, when some pairs already are defending nesting sites, and in a few cases laying eggs. Solitary pairs or several pairs together nest on islands in lakes. They also nest in wet and marsh tundras and in areas bordering marine beaches. The nest is a lined or unlined scrape, often an old one lined afresh. The clutch size is three eggs, less often two, and rarely one. Egg-laying culminates in late June but continues into early July, exceptionally later. Incubation by both sexes begins with the first or second egg. The period of incubation for the last egg of the clutch is 21 to 22 days. Young hatch as early as July 11. Siblings may hatch on consecutive days. The first sibling may leave the nest before the second hatches, and the second may leave before the third hatches. Young are attended by both parents and remain in the nesting areas until fledging. Some young fly strongly by July 30. An extended egg-laying period results in overlap of egg-laying and hatching, and also of hatching and fledging. Most young, many attended by adults, leave the inland areas for the coast in mid-August. Both young and adults commonly inhabit the coastal areas before departure in late August. None has been recorded after August 27. One-year-old birds, or yearlings, have not been recorded for the region.

Sterna paradisaea Pontoppidan Arctic Tern

Arctic Terns are thinly scattered over lake tundra about Cambridge Bay, where solitary pairs and small colonies breed. They appear to be scarce at the marine beaches during nesting, but in August small numbers occur offshore between Wellington and Anderson bays and, reportedly, all along the southeastern coast of Victoria Island. Arctic Terns also occur on Jenny Lind Island where they breed at the coasts.

Previous Records

Porsild (1951) presumably noted Arctic Terns in southeastern Victoria Island during his brief visit there in 1949, for he stated that he saw a few of these birds at most lakes visited on Banks and Victoria islands. Ellis (1956) reported "small numbers" at Cambridge Bay in 1954; he noted a nesting pair with one young on August 8, and adult and immature birds in Queen Maud Gulf on August 24. Fraser (1957) first noted the species in 1955 between Long Point and Cape Enterprise on June 12; he also observed it along the south shore of Ferguson Lake on June 16, near Greiner Lake on July 2, and along the coast between Wellington Bay and De Haven Point during August.

Arrival

In 1960 and 1962, the Arctic Tern appeared at Cambridge Bay on June 11, when a solitary bird was seen each date flying over partly open lakes several miles from the bay. Paired birds were first noted on June 13 in 1960 and on June 14 in 1962. In both years the species did not arrive in force until June 17-18. Thereafter, it could be found most any time at certain of the many lakes between Cambridge Bay and Mount Pelly.

Nesting

Arctic Terns bred inland from Cambridge Bay, laying their eggs in slight depressions or scrapes in the turf of islands and peninsulas in lakes. Solitary pairs were not uncommon, but more often two or three pairs nested near one another in close company with loons, waterfowl, and Sabine's Gulls especially. The largest concentration of Arctic Terns noted was at a fairly large lake, about a mile and a half long, near Mount Pelly. Here, on July 31, 1960, one or two pairs defended each of nine of the ten islands in the lake, there being about fifteen pairs in all. The one island not occupied had nesting Glaucous Gulls—a species not readily tolerated by the terns.

This lake-nesting by Arctic Terns was not observed by us on the Fosheim Peninsula, Ellesmere Island, where the species nested exclusively on gravelly deltas near the ocean. We found no evidence that any pairs nested near the beach at Cambridge Bay; however, we did not often visit the beaches during June and July. On Jenny Lind Island, the Arctic Terns frequented the coastal shore leads in late June. On July 1, we noted a dozen of them, some obviously paired, that were inhabiting a strip of stony beach and a small lake close by, but we failed to find a nest. We did not find a tern's nest anywhere on Jenny Lind Island up to the time of our departure on July 5, but almost certainly the species bred there (*see* Supplement, p. 227).

Egg-laying at one Cambridge Bay nest in 1960 started no later than June 19 or 20, for a clutch of two eggs was found there on the 21st. Most eggs were probably laid during the last week of June, some also in early July. An unusually late clutch of two eggs with tiny embryos collected July 19 may have been a second attempt, for two sets had been collected in exactly the same place earlier that month.

Of eight Cambridge Bay nests believed to have had full complements of eggs, seven had two eggs each and one had three. The period of incubation

for the last egg of a two-egg clutch was ascertained to be 20 days and 18 hours (error not greater than 10 hours).

Allowing 21 days for incubation, some chicks must have hatched as early as July 11, since some eggs were laid by June 20 or earlier. Fledged young, some flying strongly, were first noted on August 6, 1960, when three were collected inland. In 1962, they were first noted on August 7, when two were collected inland. Allowing 25 days for fledging (Parmelee and MacDonald, 1960), young hatching on July 11 would be flying strongly by August 5.

Departure

Following fledging, some young and adults occupied the coastal areas where they were first seen over the wide open waters of Cambridge Bay on August 13 in 1960. By August 20 they were fairly common over the bay, a number of them having moved from the inland breeding areas to the coast. In the outer coastal waters of Queen Maud Gulf, from Cape Colborne to Anderson Bay, they were decidedly scarce during August 20-21.

The only sign of a migratory movement was a flock of fifteen Arctic Terns milling offshore at Wellington Bay on August 28. A few scattered individuals were seen that day along the outer coast between Wellington and Cambridge bays.

Arctic Terns were not seen anywhere in the region after August 27 in 1962, when Sutton noted a few adults and one juvenile about six miles inland from Cambridge Bay. The species had been seen inland regularly until then.

Banding

A small downy Arctic Tern was banded at the nest about three miles inland from Cambridge Bay on July 16, 1960.

Specimens

Six adult male Arctic Terns were collected: four at Cambridge Bay in 1960 during July 6-21; one at Cambridge Bay in 1962 on August 8; one on Jenny Lind Island on June 30, 1962. Weights of three: 96.0 to 109 gm (103.66); measurements (mm) of six: flattened wing 268 to 282 (276.16), tail 180 to 200 (173.66), exposed culmen 27.5 to 32.0 (29.75), tarsus 15.5 to 16.5 (16.0).

Two adult females (weight 96.5 to 115, flattened wing 261 to 263, tail 161 to 169, exposed culmen 27.0 to 30.0, tarsus 15.0 to 16.0) were collected at Cambridge Bay respectively on July 18, 1960, and August 7, 1962.

Three fledged male juveniles (weight 104 to 114, flattened wing 181 to 227, tail 70.0 to 95.0) were collected at Cambridge Bay: two in 1960 on August 6, and one in 1962 on August 7. Flight feathers were sheathed at base in all three; down was conspicuous on the forehead and throat of one. Colours of soft parts of one: bill orange-flesh colour throughout basal half of mandible, dull brown elsewhere; legs and feet pale orange-flesh colour.

Three fledged female juveniles (weight 107 to 114, flattened wing 194 to 231, tail 85.0 to 112) were collected at Cambridge Bay: one in 1960 on August 6; two in 1962 respectively on August 7 and 21. Flight feathers

were partly sheathed at base in all three. Down was conspicuous on the forehead and dorsum of those taken in early August. Colours of soft parts of early August specimens: basal half of mandible orange to orange-flesh colour, dull brown elsewhere; legs and feet orange to pale orange-flesh colour.

One large downy female (exposed culmen 16.0, tarsus 14.0) was collected at Cambridge Bay on August 6, 1960. This chick was of gray phase with respect to down colour (*see* Bent, 1921). Quills and body feathers were obvious. Colours of soft parts: bill orange with dark tip, legs and feet bright orange.

One small downy male (exposed culmen 8.0, tarsus 10.0) was collected at Cambridge Bay and preserved when 12 hours old on July 17. It was of brown phase.

Two sets of two eggs each were collected at Cambridge Bay in 1960 respectively on July 3 and 19.

Annual Breeding Cycle

Arctic Terns arrive late in southeastern Victoria Island, the earliest recorded date being June 11. The first birds seen are solitary and few in number. They immediately occupy the inland lake tundra where pairs soon form. Islands and peninsulas in lakes are the nesting places, which often are shared with other species, notably Sabine's Gull. A few Arctic Terns lay eggs as early as June 19, but the majority do not have eggs until a week or so later. Egg-laying continues into early July. It may, under certain conditions, even continue into mid-July. The clutch size is usually two eggs, sometimes three, and probably occasionally one. Incubation starts with the first egg. The period of incubation for the last egg of the clutch is 20-21 days. Young start to hatch in mid-July. Those of late nestings hatch in early August when the oldest young fledge, the prolonged laying period resulting in overlap between egg-laying and hatching, and between hatching and fledging. Some juveniles and adults remain inland as late as August 27. Others apparently abandon the lake tundra as early as mid-August and go to the coastal waters where their numbers gradually build up until departure time (August 28 recorded). It is not known whether the species breeds near the marine beaches in southeastern Victoria Island, but it does on Jenny Lind Island.

Uria lomvia (Linnaeus) Thick-billed Murre

Our only record of the Thick-billed Murre for southeastern Victoria Island and adjacent small islands is of a single adult male that was shot in the waters of Cambridge Bay on July 30, 1960. The specimen is clearly referable to the eastern race *Uria lomvia lomvia* rather than the western race *Uria lomvia arra*. Cambridge Bay lies about halfway between the breeding cliffs of northern Baffin and Somerset islands, where *lomvia* occurs, and the cliffs of Cape Parry (northwest Mackenzie District), where the race is unknown.

Specimens

According to Ridgway (1919), *Uria lomvia lomvia* is similar to, but smaller than, *Uria lomvia arra*. The Cambridge Bay specimen (largest testis 17.0 x 4.0 mm, weight 925 gm, wing chord 202 mm, flattened wing 211,

tail 41.0, exposed culmen 33.5, depth of bill at gonidial angle 12.7, tarsus 36.5) is decidedly smaller than four specimens (in U.S. National Museum) of *arra* from the North Pacific region. Its small bill is comparable to that of a Baffin Island specimen (*in* Sutton collection).

***Cepphus grylle* (Linnaeus) Black Guillemot**

Our only record of Black Guillemot for southeastern Victoria Island is the remains of a badly decomposed specimen (wing salvaged) that was found on the tundra about two miles inland from Cambridge Bay on June 7, 1960.

Specimens

The wing (chord 153 mm, flattened 162) of the Cambridge Bay specimen is from an immature bird, since the white patch is mottled with black or dark brown. White tips to the secondaries are also present. These, according to Salomonsen (1944), are "never" found in the adult birds or any of the subspecies of the "grylle-group." Therefore, this specimen is assigned to the "*mandtii*-group." Since the bill is not available, it is not possible to separate the races of this *mandtii*-group, namely *mandtii* and *ultimus*, satisfactorily.

***Nyctea scandiaca* (Linnaeus) Snowy Owl**

Snowy Owls are common in southeastern Victoria Island some years but scarce in other years. During the lemming peak of 1960, the owls bred commonly in the Cambridge Bay area and probably elsewhere in southeastern Victoria Island. They were observed along the coasts of Queen Maud Gulf and Dease Strait as far west as Wellington Bay during August 7-8. Barry saw one near Hadley Bay on August 9, but whether the species bred on the north coast is uncertain.

Although scarce, Snowy Owls remained in the Cambridge Bay area throughout the lemming-poor summer of 1962 but did not breed. Old nest scrapes were noted that year on Jenny Lind Island where lemmings were scarce also. The few Snowy Owls that remained there did not breed. In 1966, lemmings were only moderately abundant in the Cambridge Bay area where an owl nest with seven eggs was found June 19 by Nick Jones (pers. comm.). Lemmings were less abundant on Jenny Lind Island that year when two pairs of owls bred (*see* Supplement, p. 227).

Previous Records

Not all visitors to southeastern Victoria Island have reported on Snowy Owls. The few owls that remain there during lemming lows probably were overlooked by some observers. Others remarked on their abundance. Simpson (1843) in 1839 noted that Snowy Owls "sat perched on every knoll" and Rae (1852) in 1851 observed that they "were to be found all along the shore of Victoria Land, wherever there were any elevated spots of ground or large stones for them to perch upon." Captain Joseph Bernard collected a Snowy Owl (specimen in National Museum of Canada) on Taylor Island



July 21, 1960. Snowy Owl female at nest near Cambridge Bay. Three Snowy Owl siblings banded near Mount Pelly in 1960 were later recovered—two in Ontario, Canada; one in Eastern Siberia.

on November 13, presumably in 1917. Despite the small numbers of lemmings in 1955, Fraser (1957) noted the species near Mount Pelly on May 28, near Cambridge Bay on June 10, near the south shore of Ferguson Lake on June 17, and near De Haven Point on August 10.

Owl Mounds

The land about Cambridge Bay is especially characterized by innumerable rocky ridges, bluffs, and knolls, the tops of which often have some boulders or small erratics. These are ideal perches for the owls, which in turn fertilize the nitrogen-poor soil or peat about the rocks. A rather copious vegetation develops there in time, though it covers but a spot of the larger ridges or bluffs. Tops of the smaller ridges or knolls may be covered completely. These patches of vegetation on an otherwise barren ground are the owl perches or mounds—a salient feature of the landscape. According to Porsild (1951), these perches are “everywhere” prominent on Banks and Victoria islands.

Plants of the owl mounds trap both water and seeds. They also provide food for the lemmings whose burrows ramify through the vegetation and peat and extend between rocks and beneath the boulders. Mammalian predators of the lemming are attracted to the mounds, and it is here that the Eskimo places his fox traps.

During the lemming peak of 1960 the owls caught many more lemmings than they ate. The largest number of uneaten lemmings seen below a single perch was 26 (July 19). The Snowy Owls also nested on the mounds, scratching out their scrapes in the vegetation and peat.¹ These nesting mounds were not necessarily the most prominent ones, but a few were right on the top of high bluffs. Not many birds other than the owls utilized the mounds for nesting, but Snow Geese on Jenny Lind Island were exceptional in this respect.

Stephens carefully worked out the vegetation of four owl mounds picked at random near Cambridge Bay during July 25 to August 2 in 1962. The most abundant plant common to all four mounds was *Saxifraga tricuspidata*. Slightly less abundant was the lichen *Cetraria nivalis*. Abundant plants common to three of the four mounds were *Dryas integrifolia* and the lichen *Thamnolia vermicularis*. Thirty-six species were identified in all. The plants are listed below in order of abundance for each of the four mounds.

MOUND I

Common: *Dryas integrifolia*, *Saxifraga tricuspidata*, *Polygonum viviparum*, *Cetraria nivalis*, *Thamnolia vermicularis*, *Poa arctica*, *Stellaria monantha*

Uncommon: *Oxytropis arctobia*, *Astragalus richardsonii*, *Pedicularis lanata*, *Evernia perfragilis*, *Cetraria tilesii*, *Draba cinerea*, *Draba alpina*, *Draba lactea*, *Peltigera* sp., *Salix arctica*

Rare: *Oxytropis maydelliana*, *Hedysarum mackenzii*, *Cerastium regelii*

¹Since the young owls leave the nest and wander about long before fledging, the excrement from them results in greater spread of vegetation.

MOUND II

Common: *Saxifraga tricuspidata*, *Saxifraga oppositifolia*, *Dryas integrifolia*, *Poa arctica*, *Carex rupestris*, *Polygonum viviparum*, *Arenaria rubella*, *Thamnolia vermicularis*, *Cetraria nivalis*, *Draba lactea*, *Cerastium beeringianum*

Uncommon: *Oxytropis maydelliana*, *Stellaria monantha*, *Oxytropis arctobia*, *Salix pseudopolaris*, *Salix arctica*, *Evernia perfragilis*, *Alectoria nigricans*, *Bryum* sp., *Draba cinerea*, *Draba glabella*, *Carex scirpoidea*

Rare: *Pedicularis lanata*, *Astragalus richardsonii*

MOUND III

Common: *Saxifraga tricuspidata*, *Salix arctica*, *Cetraria nivalis*, *Evernia perfragilis*, *Thamnolia vermicularis*, *Caloplaca elegans*, *Oxytropis maydelliana*, *Dryas integrifolia*, *Arenaria rubella*, *Draba cinerea*, *Draba lactea*, *Cerastium alpinum*, *Cerastium beeringianum*

Uncommon: *Polygonum viviparum*, *Oxytropis arctobia*, *Cetraria tilesii*, *Poa arctica*, *Carex rupestris*

Rare: *Pedicularis lanata*

MOUND IV

Common: *Saxifraga tricuspidata*, *Caloplaca elegans*, *Cetraria nivalis*, *Draba glabella*

Uncommon: *Dryas integrifolia*, *Salix arctica*, *Evernia perfragilis*, *Thamnolia vermicularis*, *Poa hartzii*, *Draba bellii*, *Draba lactea*

Rare: *Descurainia sophioides*

Nesting

Since the Snowy Owls did not breed in areas under consideration in 1962, the following refers to the 1960 season only. All nests found that year were on the tundra between Cambridge Bay and Mount Pelly.

It was not certain whether any owls had wintered in the Cambridge Bay region. Presumably they were there early in spring, for the people of the settlement reportedly saw some then, but kept no records. We saw the birds almost immediately upon our arrival there on May 31—two solitary individuals a few miles inland from the bay. From then to the day of our departure on August 31, Snowy Owls were common and familiar birds of the region.

Pairs were widely but not evenly distributed over the tundra, despite the fact that owl mounds and the lemming were ubiquitous. Four pairs occupied high bluffs just south of Mount Pelly, another four pairs were in low but rough country just east of Greiner Lake, and three pairs were near the upper

end of the bay within a mile of the Police Detachment. There were other pairs also, but large stretches of seemingly suitable habitat had no Snowy Owls whatever. The owl density at Cambridge Bay, therefore, was difficult to estimate. Generally, three to five pairs inhabited about 10 square miles. In addition, there were a few seemingly unmated individuals about. Presumably the pairs would have been more evenly scattered had there been more birds.

Although the owls were more or less clustered, no two nests were less than a mile apart, the territories being rigidly maintained. We found no evidence of bigamy, as sometimes is the case with Snowy Owls (*see* Watson, 1957b).

The period of egg-laying for the population as a whole was long. It was estimated that some owls had been incubating since May 15. Others were just starting to lay in early June, still others were only building scrapes. We watched one bird turn round and round in a fresh scrape that was eggless on June 3. On June 7 another individual worked diligently at an eggless scrape we had first seen on the 4th.

Of 11 nests in which the clutch was thought to be complete, the clutch size was 2/11, 5/10, 2/9, 1/8, 1/5 (average 9.3). The small clutch of five eggs was of a late nesting, for Waters had found the nest on June 23 before the clutch was complete. In all probability the first egg had been laid no later than June 16. Waters also found a nest with one egg as late as June 15; when last seen there were two eggs (June 17). These late nestings may have been second attempts. In any event, the egg-laying period for the species at Cambridge Bay was much longer than anticipated—from about May 15 to June 24.

It appeared that eggs were laid at about two-day intervals (40–48 hours) and, consequently, the young hatched at about two-day intervals when incubation was not interrupted. The usual two-day sequence was occasionally broken when some eggs failed to appear. This resulted in a longer interval between hatching of certain young. At one nest a four-day period occurred between laying of the eighth and ninth eggs (but not between the ninth and tenth eggs), and a consequent four-day interval occurred between hatching of the eighth and ninth chicks.

At another nest, four days elapsed between hatching of the eighth and ninth young, and also between the ninth and tenth young, but not between the tenth and eleventh. Since the egg-laying period in this large clutch was longer than expected, the period between the laying of the first egg (May 20) and hatching of the last young (July 13) was excessive—54 days. On the other hand, the time interval for a five-egg clutch, assuming normal egg-laying and hatching, would be only 40 days.

The period of incubation is usually determined by timing the last egg of the clutch. With Snowy Owls this is not only impractical but may be subject to error. Since incubation in that species starts with the first egg, resulting in young of different ages, the last egg laid may be neglected by the female more concerned with brooding the young within or at the edge of the nest scrape.

At one Cambridge Bay nest (observed from a blind), the female failed to cover the last two eggs of a 10-egg clutch, while brooding chicks during inclement weather. One of the eggs, the ninth, should have hatched on

July 18. Although the chick within was still alive on July 21, it did not hatch and died by the following day. The tenth egg, interestingly enough, was still being incubated by the parent owl as late as August 1, despite the fact that it was addled (no embryo) and that the young had already wandered far.

This behaviour would indicate that the instinct to remain at the nest is powerful enough to keep the female there as long as an egg (or young) is present.¹ Inasmuch as the young leave the nest at different times, the selective value of such an instinct is obvious.

The period of incubation for the fourth, seventh, and eighth eggs was taken at one nest containing 10 eggs. It was also taken for the ninth and tenth eggs at another containing 11 eggs. In all five cases it was ascertained to be 32 to 33 days (average of five eggs: 32 days, 14 hours).

The weights of young Snowy Owls were taken sporadically at several nests. The newly hatched chick weighed about 45 grams (average of three chicks 44.66). It weighed slightly more when one day old (average of four 49.25) and two days old (average of three 58.33).

Three-day-old birds weighed considerably more (average of two 83.5), as did birds four and five days old (average of five 118.0). Two seven-day-old chicks averaged 184.5 grams.

Although there was a steady gain in weight, individuals varied considerably after the first week. For example, one eight-day-old bird weighed 275 grams while another of the same age weighed only 236 grams. However, both weighed considerably more than the seven-day-old birds.

One 16-day-old bird weighed 800 grams; its sibling weighed only 550 grams when it attained that age. Two other siblings when 18 days old weighed about 900 grams each.

By 20 days of age, some young attain a weight of 1,000 or more grams. Our data show little correlation in the weights of older chicks. The table on page 178 summarizes the apparent growth rate.

A few of our marked birds were still in the nest when 20 to 22 days old, but most of them abandoned the nest when about 16 days old. Having left the nest, they sometimes returned. However, they mostly remained scattered and hidden some distance away. Strong and agile afoot, they later reconvened and moved about more or less together until they learned to fly—a phenomenon also witnessed by us on Baffin Island (Sutton and Parmelee, 1956*b*). There can be no doubt that these flightless juveniles were fed far from the nest by the parent bird, likely the male. On July 26 we found such a juvenile with a freshly killed lemming beside it.

One wandering but flightless banded young, the second oldest of the brood, was found July 27 when 33 days old. Try as we did, we failed to find its siblings that were surely close by. Both parent birds viciously defended that area—but not the abandoned nest site several hundred yards away. One young, thought to be of this brood, was seen about a mile from the abandoned nest on August 10. Still attended by both adults, it was flying strongly and could not be approached. This was our first observation of a flying young that year, although some probably had been flying for a few days.

In the same area on August 11 we shot the fifth member (40 to 41 days

¹The female alone incubates the eggs.

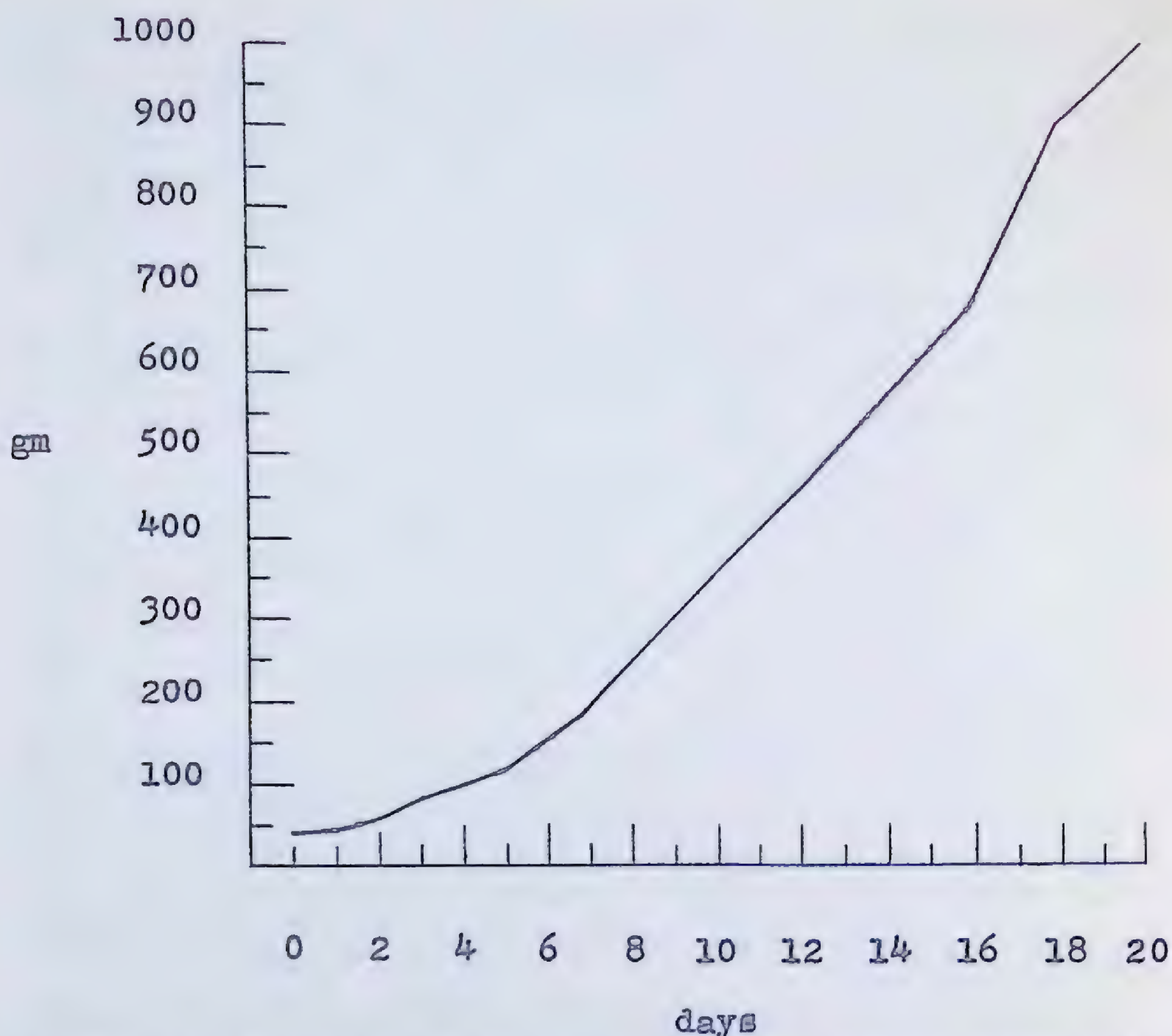


FIGURE 4—Daily growth of young Snowy Owls. Curve based in part on average weights taken at several nests near Cambridge Bay in 1960. (For detailed studies on growth curves in the Snowy Owl, see Watson (1957b).)

old) of the brood. This bird at best was a very weak flyer. Its oldest sibling (last seen when 28 days old) would have been 50 days old then and may well have been the bird seen flying there on the 10th.¹

In the same area on August 15, we again encountered two adults and, this time, two flying young that could not be approached. There on the 16th we found one that could barely fly. It glided down a slope but not far. When approached, it leaped into the water of a narrow but very long lake. By using both wings it barely made it across the deep waters to the opposite shore some 50 feet away, where it escaped us.

Fledged young were common in the Cambridge Bay region thereafter. Adult birds continued their rocking displays and injury feignings but did not attack viciously anymore.

As stated above, it was ascertained that as much as 54 days had elapsed between the laying of the first egg and hatching of the last young at one Cambridge Bay nest. Allowing 50 days for fledging, the interval from first egg to fledging of the last young would have been 104 days. This does not take into

¹According to Cook (*in* Witherby, *et al.* 1958) caged birds fledged when 51 to 57 days old.

account the post-fledging period during which time the adults attend the young for an uncertain length of time. In any event, the nesting cycle of "over three months, probably 3½ months," as estimated by Pitelka, *et al.* (1955), is reasonable.

Winter Records

We have little data on Snowy Owls during winter months in southeastern Victoria Island. According to white personnel at Cambridge Bay, owls were noted frequently within the settlement during October and November of 1960, but apparently not thereafter. On Jenny Lind Island, owls were reportedly seen at the DEW-Line Station throughout the winter of 1960-1961 when lemmings were abundant.

Food

During the breeding year of 1960, the Snowy Owls fed almost exclusively on two very abundant lemmings—the varying lemming and the brown lemming. Of the two species, the varying lemming was found most often at the owl-feeding perches and nests. Although 20 nests and innumerable perches were checked, we found but two exceptions to the lemming diet. Among several dead lemmings in a nest on July 12 was a recently killed Lapland Longspur fledgling. In another nest, on July 28, were the fresh remains of a female King Eider.

So scarce were the owls in the Cambridge Bay region in 1962, that we saw them only occasionally (June 8, August 2, September 1, one bird each date). We looked for fresh kills and pellets, but found none. Personnel at a fisheries camp near Mount Lady Pelly reported seeing an owl killing a ptarmigan beside their tent on about May 19.

On Jenny Lind Island we saw solitary birds on eight occasions during June 19 – July 5. The one bird collected had recently eaten a Baird's Sandpiper. Below an active owl perch we found the remains of an adult Canada Goose on June 27. One of the personnel at the DEW-Line Station saw an owl catch a lemming on June 30, at a time when lemmings were extremely scarce.

Banding

Forty-three Snowy Owl young were banded, 518-83102 through 518-83144, in or close to the nest on the tundra between Cambridge Bay and Mount Pelly in 1960: six siblings, three on July 12 and three (-19,-21,-22) on July 20; nine siblings, three respectively on July 12, 14, and 15, three on July 20 and three on July 28; seven siblings (-08,-09,-10,-11,-12,-13,-14) on July 18; five siblings, four on July 18 and one on July 26; three siblings (-25,-26,-27) on July 24; five siblings on July 26; eight siblings on July 26.

Noteworthy are the far-distant recoveries of three banded birds from the same nest but even more surprising were the places of recovery. Snowy Owl 518-83112 was recovered near Clyde Forks, Lanark County, in eastern Ontario on October 19, 1961; sibling 518-83108 was recovered near Hudson Bay at Attawapiskat, Ontario, on May 8, 1962 (reported by J. Spense). Wholly unexpected, then, was the report of the recovery of sibling 518-83109 west of the Kurile Islands on Sakhalin, USSR, on February 18, 1962.

A. A. Vinokurov, Chief of the Bird Ringing Centre at Moscow, reported the recovery.

Another individual, number 518-83142, banded at the nest near Cambridge Bay on 28 July 1960, was recovered at Gilby, North Dakota, on 10 January 1965.

Snowy Owl 518-83121, not quite fledged, was collected about a mile from its nest on August 11 when 40 to 41 days old. Its sibling 518-83122 was shot by Eskimo Paul Epakuak at the Ferguson River near Wellington Bay some time during June of 1963.¹

Snowy Owl 518-83127 was 16 days old when last seen in the nest on July 28, 1960. Its band was accidentally recovered in a Snowy Owl pellet within the long abandoned nest scrape, which we re-examined on May 18, 1962. Cannibalism has long been suspected at Snowy Owl nests, but it is surprising that young 16 days or older are eaten. Whether this individual was actually killed by an older sibling or an adult is uncertain. It may well have died by some other means and then been eaten.

Mortality

Cambridge Bay Eskimo consider Snowy Owls good eating and shoot them whenever they can. The birds are vulnerable during winter months when they commonly perch on wires and other fixtures within the settlement and military installations.²

Predation at a Snowy Owl's nest was noted on one occasion. On July 27, 1960, a Pomarine Jaeger twice punctured an addled owl's egg in a recently abandoned scrape. The parent owls, attending young some distance away, halfheartedly defended the nest. They flew at the jaegers but did not actually strike them.

Probably few Snowy Owl young disappeared through cannibalism, although we had proof of such behaviour at one nest (*see* Banding above). Mosquitoes molested the owlets badly at times, biting them principally about the eyes. Probably few, if any, die from mosquito bites, unless disease-causing micro-organisms are transmitted to them by the arthropods.

Most of the nestlings that perished in 1960 did so during spells of inclement weather. When not covered by the adult, the down of the nestling soon became drenched. Once the birds were large enough to leave the nest, the down and new feathers provided them protection enough.

One nest in 1960 produced 11 young from 11 eggs, and we believe that as many as 10 of them fledged. Another nesting produced no more than four fledglings from 10 eggs.

Specimens

One non-breeding adult male Snowy Owl (weight 1,630 gm, wing chord 378 mm, tail 203, culmen from cere 28.5) was collected on Jenny Lind Island on July 27, 1962. Its very white plumage, with few dark markings

¹Reportedly a pair of Snowy Owls raised four young near the Ferguson River that year when lemmings, according to Brian Beck, were "fairly numerous." Whether Snowy Owl 518-83122 was breeding is uncertain.

²A good number of Snowy Owls were shot at Cambridge Bay during October and November of 1960.

above and below, showed no heavy moult, although several rectrices were being replaced.

One breeding adult female (weight 2,025, wing chord 429, tail 223, culmen from cere 29.0) was collected at Cambridge Bay on August 28, 1960. The soiled and worn plumage, with numerous dark markings, showed heavy moult.

One flightless female juvenile (weight 1,800, wing chord 320, tail 135, culmen from cere 25.0) was collected within two miles of its nest at Cambridge Bay on August 11, 1960. Its flight feathers were still sheathed at the base. Dark down still predominated ventrally, but white winter feathers were starting to replace the down.¹ Having hatched during July 2-3, this individual (banded) was 40 to 41 days old when shot.

One large downy female (weight 355) is estimated to have been about nine days old when it was found dead at Cambridge Bay on July 28, 1960. Down of this individual was very dark. Its short primaries (22.5 mm long) were sheathed except at the very tips.

One rather small downy of uncertain sex (weight 113), probably four or five days old when it died, was presented to us by a native child at Cambridge Bay on July 3, 1960. Its down was white.

Two recently hatched males (weight 42.0 to 47.0) were salvaged at Cambridge Bay in 1960 respectively on July 2 (killed by native child) and July 13 (found dead at nest). Down in each was white.

One set of eight eggs and another of 10 eggs were collected at Cambridge Bay in 1960 on June 2 and 8, respectively.

Breeding Cycle

Nesting of the Snowy Owl in southeastern Victoria Island is highly cyclic. Many owls breed during lemming peaks, feeding almost exclusively on two species of lemming. Those few owls that remain during extreme lemming-lows feed on a variety of prey but do not breed. Reportedly, the owls breed when lemmings are on the increase at Wellington Bay area, but there is no information on clutch size or other aspects of the breeding cycle for that area. Snowy Owls commonly perch on rocky eminences made green through the years by an owl-lemming association of a highly ecological nature. These well-vegetated spots in the otherwise austere landscape occur throughout the region, being especially distinctive about Cambridge Bay. Pairs of Snowy Owls utilize these feeding perches or mounds for nest sites. Highly territorial, the pairs are solitary. The scattering of pairs is not necessarily even. The egg-laying period is long. Some pairs lay as early as mid-May, but laying does not culminate until late May and early June. It continues into mid-June and, exceptionally, into late June. Late layings may be second attempts, for the clutch of such nestings may be small (five eggs). Most clutches are large (nine to 11 eggs). Eggs are laid at about two-day intervals, in some cases four-day intervals. Incubation starts with the first egg and is carried on by the female alone. The male provides food and is most active in defence of

¹Bent (1938) states that the white body feathers of the first winter plumage push through the grey down, finally concealing it. The Cambridge Bay specimen clearly shows that this down is actually replaced, for the downy feathers in some areas are still attached to the tips of the incoming winter feathers.

the nest or young. The period of incubation is 32 to 33 days. Young hatch at about two-day intervals, in some cases four-day intervals. First young of early nests hatch in mid-June, those of very late nestings conceivably in late July. Newly hatched young weigh about 45 grams. They grow rapidly and by the end of the first week approach 200 grams in weight. Young in the nest are subject to cannibalism. Wet weather is lethal to exposed nestlings, but apparently it does not matter after the young leave the nest when about 16 days old. The oldest siblings leave before the youngest hatch. Far from fledging, the young owls scatter close by on the tundra where the male parent feeds them. Twenty-day-old young may weigh 1,000 grams or more. The female remains with the nest as long as there are eggs or young. She may even continue to incubate addled eggs for a time after the last young leave the nest. Under the care of both parents, the young eventually band together and move about the land until each in turn fledges. Young 33 days old cannot fly. Young 40 to 41 days old fly weakly, at a time when white body feathers are replacing the conspicuous dark down of the ventral side. Probably 45 to 50 days are required for strong flight. The period from laying of the first egg to hatching of the last young of a brood may be 54 days, or as few as 40 days, depending on several factors. In extreme cases the period from the first egg to the fledging of the last young of the brood may be 104 days. A few young probably fledge in early August at Cambridge Bay. Many fledge there during the remainder of the month. Those of very late nestings probably fledge in September. Both adults care for the young following fledging for an unknown period of time. Snowy Owls have been seen within the settlement of Cambridge Bay during October and November. There is no proof that they remain there throughout the winter months, but apparently some do on Jenny Lind Island during lemming peaks. Banding returns clearly indicate that siblings may migrate or drift to the same or wholly different regions of the earth. Three-year-old Snowy Owls may return in summer to within 50 miles of where they hatched on Victoria Island.

Asio flammeus (Pontoppidan) Short-eared Owl

Short-eared Owls appear to be uncommon in southeastern Victoria Island where a few pairs probably breed locally when lemmings are abundant. Whether they occur on Jenny Lind Island during lemming peaks is not known.

During the waterfowl survey of 1960, two Short-eared Owls were seen from the air near the coast of Byron Bay on August 8. This observation was more interesting when it was realized that our Eskimo guide, David Koomyuk, had previously informed us that the species bred occasionally in the Byron Bay area.

Koomyuk's description of these owls and their habits left little doubt that he knew the birds well. Some time during the summer of 1961 he shot one in the Cambridge Bay area and saved the skin to present to us. However, a dog found the skin and carried it off.

When we were encamped in the Augustus Hills during June 2-3, 1962, Koomyuk returned from a goose hunt and said that he had just seen a Short-eared Owl at a lower level not far from the beach. We searched along these

low-lying coastal slopes but failed to find it, or any of its kind, there or even elsewhere that year. In 1966 Sutton saw one flying near the Cambridge Bay airstrip on May 28.

Eremophila alpestris (Linnaeus) Horned Lark

Horned Larks are fairly common in the Cambridge Bay area where pairs inhabit the drier coastal slopes and ridges inland, and even the summit of Mount Pelly. They appear to be widely distributed in southeastern Victoria Island but may be uncommon in some areas. This is the situation on Jenny Lind Island where relatively few breed (*see* Supplement, p. 228). Although some Horned Larks of Cambridge Bay are very pale, the majority are readily referable to *Eremophila alpestris hoyti*, the race common to the Arctic Islands.

The species was noted in 1960 near the coasts of Anderson Bay (three birds, August 20–21) and Wellington Bay (small flocks, August 26–27). It was found all along the Augustus Hills during June 2–3, 1962. On the Finlayson Islands it was observed in 1962 on June 21 (one bird) and in 1962 on June 3 (two birds).

Previous Records

Ellis (1956) stated that Horned Larks were "common" in all settlements, except Bathurst Inlet and Arctic Bay, visited by him in 1954. He gave no details on the species at Cambridge Bay.

Arrival

We may have missed the early Horned Larks at Cambridge Bay in 1960, for we noted one near the coast the day of our arrival on May 31. The first seen by us in 1962 was on the very top of Mount Pelly. There, in a bare area somewhat sheltered from the wind, we collected a solitary male on May 24. This was an unexpected find, for the aspect was extremely wintry. Even more surprising was our failure to find a single Horned Lark in the more hospitable areas near the coast before May 31, when several appeared in the bunting flocks.

Horned Larks soon became abundant and could be found in many places. Some paired immediately. The testes of males collected June 1 were much enlarged; the oviduct of a female collected then was swollen. Fighting among males was first observed on June 1 and occurred on numerous occasions thereafter. Males climbed to heights of 200 feet and sang lustily. Flight singing appeared to reach a climax before June 15. A few full songs were noted even during July, but real singing by then had long ceased to dominate the activity of most males.

Nesting

Horned Larks resided on dry, often stony ridges where plant growth was limited. They commonly inhabited the barren coastal slopes of Cambridge Bay, some nesting within a stone's throw of the beaches. Within the settlement

they were familiar birds throughout the summer. One pair to three acres of ground appeared to be maximum with respect to their density in favoured areas, but many places had few or no Horned Larks.

The species also nested well back from the coast. Most interesting was its preference for the summit of Mount Pelly. There the birds inhabited a most austere environment with the Knot, a typically high-arctic bird.

Egg-laying at Cambridge Bay started early in 1960. A nest with one egg on June 8 held four eggs on June 11. A fifth egg was laid some time during June 14-20. Young hatched from the first three eggs during June 22-23; the last two eggs contained no embryos. A nest found June 26 held five eggs; another held four large young on July 3. The last young of still another nest bolted when touched on July 4. Two of these nests were within 50 paces of buildings.

Egg-laying started early in 1962 also. A clutch of five eggs (collected) that had been incubated five or six days when found June 14 indicated egg-laying as early as June 5. Another nest with one egg on June 12 held four eggs on June 16. Other nests found near Cambridge Bay that year included three with five eggs each, during June 15-16.

The relatively few Horned Larks on Jenny Lind Island also occupied the drier slopes with scant vegetation. The one nest found there held five small young on June 26.

Young Horned Larks left the nest before fledging. Two of three siblings abandoned the nest of their own volition when about a week old. The third sibling, when a week old, bolted when touched and refused to stay put when returned to the nest. Unable to fly, it fluttered and hopped along the ground and finally hid beneath a stone. Four siblings abandoned another nest during a 40-hour period; all left before fledging. Horned Larks may remain in the nest for at least 10 days (Sutton and Parmelee, 1955a).

Fledged young were fairly common at Cambridge Bay on July 5. These were attended by both sexes. A few were fed by adults as late as July 17 in 1960, and as late as July 22 in 1962, but the only evidence of a really late nesting was the collecting of a young bird mostly in juvenal plumage on August 26 in 1960. So late was this nesting that it suggests double-brooding rather than a repeat following nest failure.

The feathers of adults were badly frayed by mid-July when the moult in some was underway. A male noted July 14 had already lost his tertials. Long-tailed juveniles were also moulting. By the end of the month both adult and juvenile were moulting heavily.

Some juveniles appeared to be in winter feather by mid-August, but the moult probably was not completed until later in the month. Juveniles that were live-trapped in 1962 had virtually completed the moult by August 28, when adults were still moulting.

Departure

Horned Larks of various ages were still common at Cambridge Bay in 1962 on September 12, the date of last observation. Presumably migration had started by then, but it was not obvious.

Banding

Twenty-nine flying Horned Larks were live-trapped within the settlement of Cambridge Bay in 1962. Included were adults and juveniles of both sexes, but age and sex were not recorded in every case. The banded: two birds on August 27, six on August 28, three on August 29, two on August 30, four on September 2, one on September 3, one on September 4, seven on September 5, two on September 6, and one on September 7.

The following nestlings were banded at Cambridge Bay in 1960: two siblings on June 27; four siblings on July 3; one on July 4.

Horned Lark 221-45966, banded when an adult male at Cambridge Bay on September 6, 1962, was recovered at Cambridge Bay on May 24, 1966 (reported by R. C. Burron).

Specimens

Seventeen adult male Horned Larks were collected: five at Cambridge Bay in 1960 during May 31–July 17; seven at Cambridge Bay in 1962 during May 24–June 15; five on Jenny Lind Island in 1962 during June 22–26. Weight (gm) and measurements (mm) of the 17: weight 37.5 to 45.0 (av. of 15 birds 41.4), wing chord 106 to 114 (av. of 16 birds 110.62), tail 64.0 to 74.5 (70.23), exposed culmen 10.5 to 14.0 (12.03), tarsus 22.5 to 24.0 (23.52). The only bird of the series, in badly frayed plumage and heavy moult, was collected July 17.

Six adult females were collected at Cambridge Bay: three [weight 33.0 to 40.0 (35.66), wing chord 100 to 102 (101.0), tail 61.0 each, exposed culmen 11.5 to 13.0 (12.6), tarsus 22.5 to 23.0 (22.83)] in 1960 during July 17–26; three [weight 45.0 to 46.0 (av. of two 45.5), wing chord 99.0 to 107 (103.33), tail 61.5 to 67.0 (64.83), exposed culmen 10.5 to 13.0 (12.0), tarsus 23.0 to 24.0 (23.33)] in 1962 during June 1–15. The badly frayed July specimens were moulting extensively.

Most of the above specimens can be referred to *Eremophila alpestris hoyti*. They are clearly separable from a series (in Sutton collection) of *Eremophila alpestris alpestris* from Frobisher Bay, Baffin Island, and from a series (in National Museum of Canada) of *Eremophila alpestris arctica* from British Columbia. However, the throats of several Cambridge Bay males are white and comparable to those of *arctica*. Whether these few birds represent aberrant individuals or an invasion of *arctica* is difficult to say. Most Horned Larks noted by us had yellowish throats. The pale birds were sought after and considered rare.

One fledged male juvenile (weight 43.0, wing chord 111), virtually in complete first winter plumage, was collected at Cambridge Bay on August 29, 1962.

A fledged female juvenile (weight 36.0, wing chord 92.0) collected at Cambridge Bay on August 26, 1960, was atypical in that it still had most of its juvenal plumage, including spotting of the head and upper parts. First winter feathers were obvious along the sides of the breast and belly. A new tail (shorter than tail coverts) was incoming, likely a result of accidental loss of tail feathers.

Three young in typical juvenal feather were collected at Cambridge Bay in

1960: a flightless, eight-day-old male (weight 22.0, wing chord 57.0, tail 18.0, exposed culmen 7.0, tarsus 21.0) on June 30; a weak-flying male (weight 32.0, wing chord 71.0, tail 32.0, exposed culmen 10.5, tarsus 23.0) on July 3; a fully fledged female (weight 25.0, wing chord 91.0) on July 11.

One abandoned nest with two eggs (no embryos) and one nest with a complete clutch of five eggs were collected at Cambridge Bay respectively on June 30, 1960, and June 15, 1962.

Annual Breeding Cycle

A few male Horned Larks may return to the Victoria Island breeding areas as early as May 24, but the majority of both sexes arrive during the last days of May and first days of June. Territorial behaviour, flight-singing, and pairing begin almost immediately. The breeding habitat is dry, stony tundra near marine beaches or inland. Nest construction by some individuals takes place soon after arrival, for the first eggs are laid early in June. Egg-laying probably culminates in mid-June. The clutch is five eggs, probably four and six occasionally. Some young hatch by June 22-23. Some leave the nest when only a week old and run about the tundra before fledging. Flying young are conspicuous by July 5. Both adults attend young following the fledging. By mid-July some adults and juveniles are moulting, and by the end of the month the moult is extensive. Some juveniles virtually complete the change into first winter feather in late August. Most adults probably complete their moult in early September. Late August juveniles in spotted plumage are from unusually late nestings, which appear to be uncommon. The breeding schedule of Horned Larks on Jenny Lind Island is no later than that of southeastern Victoria Island. The fall migration is poorly known for both areas, but adults and juveniles are still common at Cambridge Bay as late as September 12.

Iridoprocne bicolor (Vieillot) Tree Swallow

A single Tree Swallow flew about overhead on Jenny Lind Island the day of our arrival there on June 19, 1962. We failed to note it again, but a short time later it was seen 'puffed up' on a window sill at the DEW-Line Station by one of the personnel living there. According to Snyder (1957), a specimen in the Royal Ontario Museum had been taken at Levesque Harbour, Boothia Peninsula, in early August of 1952.

We noted two Tree Swallows flying near the Cambridge Bay airstrip on May 28, 1966.

Riparia riparia (Linnaeus) Bank Swallow

A single Bank Swallow was caught in one of the DEW-Line Station buildings on June 6, 1966. Two were seen flying above the station grounds on June 22 by Charles MacKinnon.

Specimens

An adult male (lean, testes enlarged) collected on Jenny Lind Island on June 6, 1966, is referable to *Riparia riparia riparia*.

Hirundo rustica Linnaeus Barn Swallow

A Barn Swallow (*Hirundo rustica erythrogaster*) collected by Sweatman (1951) two miles west of Cambridge Bay on June 30, 1951, is the only positive record of the species for Victoria Island. Several white residents reported seeing 'swallow-like birds' flying about the settlement of Cambridge Bay during the summer of 1962, but our searchings failed to disclose such birds.

Corvus corax Linnaeus Common Raven

Ravens (*Corvus corax principalis*) are uncommon at Cambridge Bay where they are occasionally seen at the settlement. They breed sparingly at sea cliffs on the Finlayson Islands and probably on the Richardson Islands and nearby precipitous coast of Victoria Island, where two individuals were seen on August 8, 1960. None was recorded for Jenny Lind Island in 1962 (see Supplement, p. 228).

Previous Records

Collinson (1889) stated that two ravens were seen at Cambridge Bay on November 13, 1852.¹

Nesting

A raven's nest is on a sea cliff immediately below the Finlayson Islands gullery. When first examined June 21, 1960, there were five feathered young, the largest of which was ready to fledge. Allowing three weeks for incubation and another four to five weeks for fledging (see Bent, 1946), egg-laying at this nest must have taken place before May, probably in late April.

Material comprising the nest was decayed vegetation, willow twigs, and 12-inch pieces of pine board that probably had been picked up along an Eskimo's trap-line. Except for the cup that had been lined afresh, the nest appeared old and probably had been used for many years. Well sheltered by an overhang, it was reached only by means of a rope, though situated only 15 feet above the sea ice, which was firm against the rocks. Occupied nests of Glaucous Gulls were high above the raven's nest; those of Thayer's Gulls were above and to one side. The many gull eggs were nearly fresh at that time. The parent ravens, flying in from over the sea ice for an occasional look, never did come really close.

This raven's nest appeared to be unoccupied when we visited the cliff on June 3, 1962. A large accumulation of snow on a ledge above deemed it unwise to climb to the structure, and it was presumed to be empty because of its flat, dilapidated appearance. A pair of ravens flew above that day, as they did in 1960; they probably had another nest hidden among the rocks. We failed to find it.

A young raven that stood on the ground beside a trapper's hut at Starvation Cove on the south coast (west of Cambridge Bay) was collected August 28. Another raven was seen flying across the cove the same day. We failed to observe any near the Cambridge Bay settlement or DEW-Line Station in 1960.

Ravens were seen there a number of times in 1962: one near the airstrip

¹At Walker Bay, in far western Victoria Island, Collinson recorded the species in December of 1851 and on March 17 in 1852.

on May 8; one flying low over the settlement on May 13; one flying from the village dump on the ice of Cambridge Bay on May 24; one flying from the settlement on May 29; one flying across the bay towards Dease Strait on June 1; one at the DEW-Line Station dump on September 7.

Specimens

One young female Common Raven (weight 1,325 gm, wing chord 403 mm, tail 225, exposed culmen 63.0, tarsus 64.0) was collected at Starvation Cove on August 28, 1960. Its juvenal body feathers were undergoing extensive moult, the incoming fall feathers being especially conspicuous on the throat. The measurements of this juvenile, especially with reference to the bill, are smaller than expected for an adult.

Two nestlings were collected at the Finlayson Islands gullery on June 21, 1960. The first, a male (weight 1,100, wing chord 227, tail 89.0, exposed culmen 59.0, tarsus 73.0), was ready to fledge. The second, by far the smallest of the brood of five, was a female (weight 950, wing chord 166, tail 48.0, exposed culmen 47.5, tarsus 52.0) not ready for fledging.

Annual Breeding Cycle

Ravens are probably resident most, if not all, of the year at the coast on southeastern Victoria Island and adjacent small islands. It is not known whether they breed or ever occur very far inland. Sea-cliff gulleries are the known nesting places. As in other parts of the Canadian Arctic, the ravens breed earlier than any other bird, probably laying their eggs in April. Young from such nestings fledge in late June.

Anthus spinoletta (Linnaeus) Water Pipit

Water Pipits appear to be uncommon and highly local birds in southeastern Victoria Island. A small colony breeds on Mount Pelly, and a few pairs probably breed in restricted areas from Anderson to Wellington bays. Likely they breed elsewhere along the coast and on adjacent small islands where the habitat is suitable. These birds are best referred to the race *Anthus spinoletta rubescens*, which breeds extensively in the Canadian Arctic.

The species occurs on Jenny Lind Island where it is not known to breed (see Supplement, p. 228).

Previous Records

Ellis (1956) reported that he saw American Pipits occasionally at Cambridge Bay in 1954 but did not give exact locations. The species was seen on one occasion only by Fraser (1957), who found it in a "large gully" just west of Long Point on July 30, 1955.

Nesting Habitat

Much of the terrain visited by us in southeastern Victoria Island was not well suited to Water Pipits, and it is not surprising that we recorded so few birds. The Mount Pelly colony was of special interest in this respect. Probably less than a dozen pairs nested in a very restricted area on a slope rather

high up near the southeast end of the mountain in 1960 and 1962. There the vegetation was sheltered and watered by the slowly melting snows from above. Certain wet-ground plants, notably *Equisetum* and *Cassiope*, grew profusely there. Mosquitoes, also, were good indicators of the special environment, for they were troublesome there but not elsewhere on Mount Pelly where the aspect was mostly dry and windswept. Although we failed to find a nest or flightless chick, we did observe a parent pipit carrying food to young that were hidden somewhere on the slope July 10, 1960.¹ On June 17, 1962, an adult male with enlarged gonads (left testis 10.0 x 6.5 mm) was collected there. We did not often visit the pipit slope, but when we did, pipits were invariably seen.

On one of the larger islands of the Finlayson group, we watched a male pipit perform display flights on June 21, 1960. It was the only one seen, however. Some of the wet, well-vegetated basaltic slopes of these islands are similar in many respects to those about Frobisher Bay, Baffin Island, where pipits are abundant.

The lush meadows above the east inlet of Anderson Bay appear to be ideal for Water Pipits. There on August 21, 1960, we saw five in a flock, possibly a family, and collected one of them (adult female). Some of the country east of Wellington Bay appears to be suited to the species also; however, we failed to find it there during August 26-28 in 1960. Good pipit habitat was not found anywhere on Jenny Lind Island, where the species went unnoticed in 1962 during June 19 - July 5.

Specimens

Two adult male Water Pipits were collected on Mount Pelly, one (weight 21.0 gm, wing chord 85.0 mm, tail 65.0, exposed culmen 13.5, tarsus 23.0) on June 17, 1962, and one on August 3, 1960. The August specimen was in heavy moult; its flight feathers were being replaced (one old rectrix only).

Three adult females were collected in 1960, two on Mount Pelly during August 2-3, and one (weight 22.0, tail 61.5, exposed culmen 13.5) near Anderson Bay on August 21. The early August specimens were in heavy moult; their flight feathers were being replaced. The late August specimen was mostly in fresh autumn feather; its outer primaries were still sheathed at the base and not full length.

The worn birds are so variable that they are not very useful in determining racial characteristics. According to W. Earl Godfrey (pers. comm.), the fresh autumn specimen comes closest to *Anthus spinoletta rubescens*. On the basis of this small sample, we refer the Victoria Islands birds to *rubescens* until a better sample is available.

Annual Breeding Cycle

Little is known of the Water Pipit in southeastern Victoria Island. The earliest recorded date for the species there is June 13, the latest date, August 21. Small numbers breed in highly restricted areas, only a few of which

¹According to Taverner (1916), two nests and a set of five eggs were collected by Captain Joseph Bernard in the Coronation Gulf region during June 13-15, 1911.

have been located in the region. Males perform display flights during June 21-29. Young hatch by July 10, probably earlier. The summer moult in adults is well under way in early August and is virtually completed in late August.

***Agelaius phoeniceus* (Linnaeus)** Red-winged Blackbird

Heretofore not reported from the Canadian Arctic Archipelago, the Red-winged Blackbird is considered a rare visitor at Cambridge Bay by at least a few of the natives. On June 28, 1960, we collected an adult male that sang near the settlement. Its gonads were enlarged (largest testis 13.0 x 8.0 mm), but apparently it was not mated. It is referred to the race *Agelaius phoeniceus arctolegus*.

Specimens

One adult male (weight 80.0 gm) in heavy moult was collected at Cambridge Bay on June 28, 1960. Its measurements (wing chord 128 mm, tail 96.0, exposed culmen 22.7, depth of bill at base 12.9, tarsus 30.0) compare favourably with those given for *arctolegus* (see Oberholser, 1907).

***Acanthis hornemanni* (Holboell)** Hoary Redpoll and
***Acanthis flammea* (Linnaeus)** Common Redpoll

Heretofore not reported from southeastern Victoria Island, both the Hoary Redpoll (*Acanthis hornemanni exilipes*) and Common Redpoll (*Acanthis flammea flammea*) breed in the Cambridge Bay area where they flock together and probably hybridize to some extent.

The only redpolls seen by us in 1960 and 1962 were within or fairly close to the settlement of Cambridge Bay. Whenever we failed to identify the birds to either species, we recorded them as redpolls only, a convenience used in the following account.

Arrival

On the day of our arrival at Cambridge Bay, May 31, 1960, a flock of five redpolls fed on grass seed in snow-free places near the main road of the settlement. Possibly two dozen birds fed here on several days following. From this flock we collected Hoary and Common redpolls of both sexes during June 1-2. The testes of the males were enlarged, but the females were not yet laying. Paired birds were not obvious. The redpolls dispersed some time after June 2. Except for a solitary individual on June 11, we did not see them again in that particular area of the settlement.

A few white residents of Cambridge Bay knew the birds. Reverend Mr. William Evans had captured one in his home that year on May 7. He kept it for several days and then released it.

Being especially watchful for redpolls following our arrival at Cambridge Bay on May 19, 1962, we were disappointed at not finding them anywhere in the area until May 31. That day a single redpoll flew with a flock of Horned Larks, Lapland Longspurs, and Snow Buntings about a mile beyond the airstrip, some distance from the settlement. Weeks passed before we saw another redpoll.

Nesting

Redpolls no doubt were in the Cambridge Bay area in 1959. William Bock told of a nest that had been found near the settlement that year. His description left little doubt that it was a redpoll nest, though oddly enough it had been built in a clump of grass close to the ground.

We first believed that the redpolls that had flocked at the settlement in the spring of 1960 had later abandoned the bleak coastal slopes for the sheltered ravines inland where willow grew profusely, but we did not succeed in finding them there.

The redpolls, some of them at least, were nesting in spruce trees that had been brought up from the south for the Christmas holiday and later discarded. Although we have reported on this interesting behaviour (Parmelee and Schmidt, 1961), a detailed and somewhat different account is presented below.

One nest was in a relatively green Christmas tree that had been set upright in a metal drum filled with rocks beside the Catholic Mission across the bay from the main village. The redpolls, according to Father Lemer, had taken over the tree early in June. The feather-lined nest held three eggs on June 10 and five eggs on June 12. The parent birds were not seen at the same time; invariably the bird seen on the nest was a Common Redpoll. Egg-laying at this nest was early. Years ago, Taverner (1916) reported on five redpoll nests with three to five eggs each collected in the Coronation Gulf area by Captain Joseph Bernard during June 12-16.

The first sibling of the 'Catholic Mission Nest' hatched on June 22, the second during June 22-23, the third and fourth during June 23-24. One egg (no embryo) failed to hatch. The two oldest siblings, when 11 to 12 days old on July 4, apparently left the nest of their own volition. On July 7, the first or oldest sibling, when 15 days old and flying strongly, was caught 200 yards from the nest and released on the spot. Immediately a parent bird flew to it. Although well feathered, the two youngest siblings remained in the nest much longer than expected, finally leaving on July 9 when 15 to 16 days old. A fledging period of nine days has been ascribed to the Greenland race, *Acanthis flammea rostrata* (Witherby, *et al.*, 1958).

Another nest was in an old Christmas tree near the Anglican Mission. This tree lay flat on the ground and was very dry and brown. When first checked on June 23, the nest held five eggs. Invariably the bird seen on this nest was a Common Redpoll also; however, we failed to observe both parents at once, and the same individual could have been seen each time. The first young hatched on June 30, and on July 4 there were five young. All perished shortly thereafter (*see Mortality below*).

A third nest was in a Christmas tree beside a Hudson's Bay Company shed; only the trunk and a few limbs and needles remained. The nest held five eggs when first checked on June 23. The female of this nest, a Hoary Redpoll, was so broody that we often lifted her off the nest in checking the eggs. Only then did we realize that its unbanded mate, believed to be a subadult Common Redpoll, visited the nest occasionally when the other was away. This bird was not nearly so confiding, and we failed to catch it. We did not feel justified in

collecting more redpolls.¹ Photographs taken of the birds later substantiated our belief that a Hoary Redpoll was mated to a Common Redpoll at this particular nest.²

The first young of the 'HBC' nest hatched late on July 1, the second early on July 2 within 14 hours of the first. The third hatched during July 2-3, the fourth on July 3. All four young hatched in about a 48-hour period. One egg (no embryo) failed to hatch. We banded the young on July 11 when they were much too large, for upon being handled all four bolted. Although we managed to put them back, the four left later that day.

Only one redpoll nest was reported from Cambridge Bay in 1961. According to Fred Ross, a pair started to build a nest on a "gasoline trailer pump" of a type used in servicing aircraft. Before the nest was completed the trailer was moved several hundred yards to a new place. The redpolls followed, completed the nest, and laid five eggs. The incubating bird was confiding, and a number of times we observed it being fed at the nest by the male. Dates were not recorded during egg-laying, but it was noted that the first chick hatched on July 8. This was a fairly late date. Allowing 11 to 12 days for incubation, egg-laying at this nest probably started about June 21. Five young hatched. All were destroyed by a predator some time during July 15-16.

In 1962, we searched diligently for nesting redpolls within the settlement, but found none, despite the fact that we had scattered a number of old Christmas trees about the area during May. Much later, on July 10, we noted what was probably a male Common Redpoll among high willows inland, about a mile from the settlement. A Common Redpoll, perhaps the same individual, was seen in exactly the same place the following day—however, our searching failed to turn up a nest or young birds. It is possible that the redpolls did breed in such areas that year. On July 23, two separate redpolls flew high above the settlement and one later alighted among the buildings. This was our first observation of one within the settlement that year.

Departure

Redpolls were last seen at Cambridge Bay in 1960 on August 14, when two flying together alighted momentarily within the settlement. In 1962, two redpolls flew about together within the settlement on September 7, and a flock of five was there on September 12. These September birds appeared to be juveniles, but whether they were local or from afar is uncertain.

Banding

The following redpolls were banded within the settlement of Cambridge Bay in 1960: four siblings in the nest on June 28 (one parent was *Acanthis flammea*, the other was unknown); four siblings were banded in the nest on July 11 (one parent, *Acanthis hornemanni*, was banded on June 28, the other was believed to have been *Acanthis flammea*). One of the banded nestlings was found dead near the nest on July 12.

¹The Cambridge Bay population was obviously small. Conceivably it had only established a precarious foothold in the area.

²According to Heinrich Springer (pers. comm.), the female may have been an intermediate of *flammea* x *hornemanni* subadult. This individual had a small bill and a conspicuous whitish rump.

Mortality

Four young at the redpoll nest near the Catholic Mission at Cambridge Bay in 1960 fledged. This nest probably would have been destroyed by curious Eskimo children had they not been told to leave it alone.

The nest near the Anglican Mission that year was not successful. To prevent predation by domestic cats, Reverend Mr. Evans completely covered the nest-tree with wire fencing, the mesh of which was just large enough to permit the incubating bird to pass through. This it did, as though the wire were not there. Following hatching, some animal tore the nest, spilling the small young. One young was partly eaten, and the others soon perished from exposure. A lemming may have spoiled this nest, causing the redpolls to desert. The only other mammal of the area small enough to pass through the wire fencing was the ermine, but it seems likely that a predator of its kind would have bitten each of the brood.

The redpoll nest near the Hudson's Bay Company was not entirely successful. Two of the four young left the nest prematurely, and at least one of them died during the inclement weather that followed. We found it, the third oldest sibling, on the ground eight feet from the nest.

In 1961, Fred Ross kept a redpoll nest under surveillance within the main settlement of Cambridge Bay. Following hatching of the redpolls, an ermine was seen trying to reach the nest. All avenues of approach were believed to have been removed, but the nest and young were destroyed.

Specimens

The following adult (or subadult) redpolls were collected within the settlement of Cambridge Bay in 1960. One male *hornemanni* (weight 12.5 gm, wing chord 72.5 mm, tail 59.5, exposed culmen 8.0, bill from anterior edge of nasal fossa to tip 6.4, tarsus 15.5) and one adult female *hornemanni* (weight 12.0, wing chord 71.5, tail 59.5, exposed culmen 8.0, bill from anterior edge of nasal fossa to tip 6.5, tarsus 15.0) were collected on June 2. These Hoary Redpolls, much too small for the nominate race, are referred to the race *exilipes*.

Three male *flammea* [weight 13.0 to 16.0 (14.33), wing chord 69.0 to 73.0 (71.5), tail 54.0 to 55.0 (54.33), exposed culmen 8.0 to 8.5 (8.33), bill from anterior edge of nasal fossa to tip 7.0 to 7.5 (7.3), tarsus 15.0 each] were collected during June 1-2. One of the males has pronounced rosy colour on throat, pectoral, and rump areas; one has a distinct but pale rosy wash along sides of throat and on pectoral area; one has a few rosy spots on the pectoral area only. One female *flammea* (weight 13.0, wing chord 68.0, tail 55.0, exposed culmen 8.0, bill from anterior edge of nasal fossa to tip 7.0, tarsus 15.0) was collected on June 1. These Common Redpolls, too small for the Greenland race *Acanthis flammea rostrata* and too short-billed for the Pacific race *holboellii*, are referred to the nominate race *flammea*.

One female (weight 11.5, wing chord 72.0, tail 56.0, exposed culmen 8.0, bill from anterior edge of nasal fossa to tip 6.9, tarsus 15.0) was collected on June 1. This individual, possibly a hybrid, tends toward *hornemanni* in

its rather light rump and under tail coverts but comes closest to *flammea* with respect to bill length.

One flightless female *flammea* x *hornemanni* (wing chord 36.5, tail 12.5, exposed culmen 4.0, tarsus 13.0) was found dead near its nest on July 12.

One small nestling was found dead near its nest on July 5 and was later preserved in alcohol.

Annual Breeding Cycle

Redpolls arrive at Cambridge Bay early and go about in flocks composed of Hoary and Common redpolls and probably hybrids. The birds disperse in early June. Some remain within the settlement and build nests in places that are highly artificial. Others apparently nest close by in willow areas. Egg-laying starts by the end of the first week in June. It appears to culminate in mid-June but may continue until June 25, possibly later. The known clutch size for the Cambridge Bay area is five eggs. Incubation is carried on chiefly by the female, and may start before completion of the clutch. Hatching of young takes place as early as June 22 and may continue beyond July 8. Some young leave the nest as weak fliers when 11 days old; siblings of these birds may remain in the nest until 15 to 16 days old, by which time juvenile redpolls fly strongly. Little is known about the behaviour and moulting of juveniles or adults in late summer and fall. Redpolls flock in the area as late as September 12, probably later. Hoary and Common redpolls behave as one species at Cambridge Bay. However, the frequency of inter-breeding is not known for the area; whether the collecting of specimens from the spring flocks or the presence of artificial sites influences the breeding behaviour is not known. The Cambridge Bay population appears to be unstable. Its chances for survival are probably greatest away from the settled area during nesting.

Passerculus sandwichensis (Gmelin) Savannah Sparrow

Savannah Sparrows appear to be rare in southeastern Victoria Island, and there is no real evidence that they breed there. Although we were ever watchful for them at Cambridge Bay, our only observation was at the Augustus Hills (one bird, June 3, 1962). Since the species is a fairly common nesting bird at Perry River (Hansen, *et al.*, 1956), it is surprising that we failed to find it a short distance to the north on Jenny Lind Island.

Junco hyemalis (Linnaeus) Slate-colored Junco

A flock of six Slate-colored Juncos (two collected) flew about the DEW-Line Station grounds on Jenny Lind Island on June 1, 1966. From one to three birds were noted on or near the station grounds as late as June 12.

Specimens

One adult male (weight 23.1 gm, very fat, testes enlarged) and female (18.9 gm, very fat, largest ovum 0.5 mm, crop full of small seeds) were collected on Jenny Lind Island on June 1, 1966.

***Spizella arborea* (Wilson) Tree Sparrow**

Heretofore the Tree Sparrow has not been reported from Victoria Island, where it must be considered an accidental until proven otherwise. It appears to be a regular visitor to Banks Island, according to Manning, *et al.* (1956), who state that it can be expected as a wanderer and possible breeder in parts of western Victoria Island.

We failed to find the species anywhere on Victoria Island in 1960, but noted two birds within a mile of Cambridge Bay on June 5, 1962. One of them, a female (largest ovum 1.5 mm) in worn feather, was collected. It is referred to the race *Spizella arborea ochracea*.

Specimens

One adult female (weight 16.0 gm, wing chord 70.0 mm, tail 68.5, exposed culmen 8.5, tarsus 20.0) was collected at Cambridge Bay on June 5, 1962. It compares favourably with a small series (in National Museum of Canada) from Banks Island.

***Zonotrichia querula* (Nuttall) Harris's Sparrow**

At least three Harris's Sparrows visited Jenny Lind Island in 1966. We collected a male at the DEW-Line site on June 1, and another on June 5, when two were observed. One was heard there on June 6 but none thereafter. These few birds commonly perched on the buildings, antennas, and other structures, from which they sang full songs.

Specimens

Two adult male Harris's Sparrows (very fat, testes much enlarged) were collected on Jenny Lind Island in 1966 on June 1 and 5 respectively.

***Zonotrichia leucophrys* (Forster) White-crowned Sparrow**

White-crowned Sparrows probably are occasional non-breeding visitors to the region, though we failed to note the species in 1960 and 1962. The following were observed on Jenny Lind Island in 1966: one (collected) at the DEW-Line Station on June 1; one at the site on June 12; one on a rocky slope near the site on June 21.

Specimens

One female (very fat, largest ovum 2.0 mm) collected on Jenny Lind Island on June 1, 1966, is referable to *Zonotrichia leucophrys gambelii*.

***Calcarius lapponicus* (Linnaeus) Lapland Longspur**

The Lapland Longspur is the most abundant nesting bird in the Cambridge Bay area and likely the most generally distributed bird throughout south-eastern Victoria Island. It appears to be relatively uncommon some years

on Jenny Lind Island where widely scattered pairs bred in 1962 (see Supplement, p. 228). The birds of these areas are dark and referable to the nominate race *Calcarius lapponicus lapponicus*.

Lapland Longspurs were noted commonly along the coast between Anderson and Wellington bays during August 20–28 in 1960. Except for a male found in a Peregrine Falcon on June 3, 1962, none was noted during brief visits to the Finlayson Islands where the species likely breeds. None was noted in the Glenelg Bay area near the northern coast of Victoria Island on June 8, 1962.

Previous Records

Porsild (1951) stated that the Lapland Longspur was the only common small land bird in most places visited by him in 1949, including Washburn Lake and Cambridge Bay. Ellis (1956) reported seeing adults and flying juveniles at Cambridge Bay in 1954. Fraser (1957) considered the species abundant in southeastern Victoria Island in 1955, but less so than Snow Buntings.

Arrival

Many Lapland Longspurs, some paired, were at Cambridge Bay the day of our arrival, May 31, 1960. Numerous pairs were noted on the tundra north of the settlement on June 1, when flight singing was first recorded. Flocking was not evident.

In 1962, the species was looked for but not observed anywhere in the Cambridge Bay area before May 31. That day two mixed flocks containing 50 birds each with a preponderance of males flew and fed near the bay. During stormy weather of June 1, numerous mixed flocks containing about equal numbers of the sexes fed along the bay in snow-free places that were more or less sheltered from the snowy gales. These flocks contained 15 to 20 birds usually, including a few Snow Buntings. The largest flock seen then was one of 30 birds. Flight singing was first observed on June 2 in the Augustus Hills. There the display sometimes started from, and ended on, the snow. By June 4, despite continuing inclement weather, flight singing was evident in the Cambridge Bay area. Mixed flocks fed then but not on June 5, by which time the birds were widely dispersed. Pairs were soon common, and flight singing was fast approaching a peak of activity.

The species was common in the Cambridge Bay area on May 28, 1966, when we noted several small flocks, several females, and many displaying males.

Arrival appears to be similar on Banks Island. At De Salis Bay the species was first noted on May 29 when males outnumbered females, but by June 1 the sexes were about equally represented (Manning, *et al.*, 1956); in 1953 a male was noted at Sachs Harbour as early as May 19, but the species was not abundant there until May 29; the main migration was over by June 3.

Arrival in areas near Victoria Island may be late. Although the Lapland Longspur is the commonest bird on Prince of Wales Island (Manning and Macpherson, 1961), it was not seen there before June 14 in 1958. On the Adelaide Peninsula (Macpherson and Manning, 1959), the species was not seen before June 6 in 1957. Lapland Longspurs went about in flocks as late

as June 17 in the Perry River area, according to Hanson, *et al.* (1956). On the other hand, two male Lapland Longspurs were collected on King William Island as early as May 8 in 1904 (Schaanning, 1933).

Nesting

The Lapland Longspur was typically a bird of hummocky wet tundra in the Cambridge Bay area, but it was also quite common on the drier, fairly well-vegetated slopes. Its greatest density appeared to be within three miles of the bay where one and two pairs commonly inhabited an acre of tundra, sometimes just up from the beach. It also occurred well inland, even on the summit of Mount Pelly where it roosted and perhaps bred. It was a familiar bird of disturbed and settled places, nesting close to roads and buildings. The species was found commonly in so many places that it had by far the greatest biomass of any bird of the region.

Construction of nests started in early June. In 1960, a male with nesting material was noted as early as June 2, but whether it went to a nest is uncertain. A male was twice seen carrying material on June 4; still another was seen leaving a partially built nest on June 8. A female was observed with nesting material on June 9, when copulation was first observed. In 1962, nest building was first observed on June 9 and commonly thereafter. The females alone seemed to be nest building. Whether the male builds or simply carries material about to entice females is uncertain.

About 70 nests, including those found by Waters, were observed in the Cambridge Bay area. Most were well hidden in grassy or sedgy hummocks or banks in wet areas. Some were in dry situations, in a mat of vegetation or vegetated depression. Nests in dry situations were often partly exposed from above. One completely exposed nest was just six feet from a similarly exposed nest of Baird's Sandpiper. A most atypical nest was beneath a tilted, flat rock on a dry slope. These many nests were warmly lined, usually with feathers. Some contained lemming fur, and some were lined with eider-down.

Egg-laying in 1960 probably started by June 9, since two nests with three eggs each were noted on June 11; another with six eggs on June 14 indicated laying before the 10th. A peak in egg-laying probably occurred in mid-June. The collecting of a female with an egg in its oviduct on June 28 and the discovery of a single fresh egg in a nest on June 29 showed that it occurred in late June. A nest with four small young and a pipped egg on July 21 indicated that it occurred as late as July 8; but late nestings of this sort were exceptional and may have been repeats.

Egg-laying started about the same time at Cambridge Bay in 1962. The first nest found was empty on June 10 but held an egg on June 11. A nest with three eggs on June 13, another with five on the 15th, and another with six on the 16th indicated egg-laying about June 10. On Jenny Lind Island, where the species nested chiefly in wet tundra, egg-laying on a population basis also lasted many days. A nest with six eggs on June 20 indicated egg-laying on June 14 or earlier; another with three eggs on June 30 and five eggs on July 2 was a late nesting.

Of 48 nests at Cambridge Bay where the clutch was probably complete,

26 nests held six eggs each, 15 nests held five eggs each, and seven nests held four eggs each. Of 11 nests observed on Jenny Lind Island during June 20 to July 2, five nests held six eggs each, six nests held five eggs each, and none was found with four eggs: some of the five-egg clutches may not have been complete.

Incubation commonly started before completion of the clutch—by the third egg at some nests. Although a few males may have participated in nest building, and many probably fed nestlings, the females alone incubated. Not once did we flush a male from eggs. The period of incubation from laying of the first to hatching of the last egg of the clutch was ascertained to be 12 days and five hours (error probably not greater than six hours) at one nest near Cambridge Bay in 1960. In each of two exactly known cases at Clyde Inlet, Baffin Island, the period was 12 days (Wynne-Edwards, 1952).

Hatching commenced in late June. Some young in 1960 probably hatched as early as June 23, because eggs were being incubated as early as June 11. Young were first observed on June 24, when three nests had two, two, and three young respectively, in addition to unhatched eggs. Many young were in nests thereafter, but especially during June 28 to July 8 when a peak in hatching probably occurred. Comparatively few young were in nests in mid-July, and only a single nest under observation held young after July 20.

Incubation before completion of the clutch resulted in prolonged hatching of the brood. For example, a nest with five eggs on June 23 held three eggs and two young (from the first two eggs laid) on June 24. The fifth egg (last egg laid) hatched on June 26. All five young (banded) were in the nest on July 2. On July 3, the oldest sibling was missing. The remaining four bolted when touched and would not stay put when returned to the nest. The second oldest sibling was nine days old and hardly fledged. The youngest sibling was 7.5 days old. Several observations in 1960 indicated that some young left the nest when seven to nine days old. Young left nests on Baffin Island when nine or ten days old (Sutton and Parmelee, 1955).

Young abandoned the nest before they could fly. Of six siblings (banded) in a nest on July 8, only two remained on July 10. Of these two, one was caught by hand 300 yards from the empty nest on July 11; at least seven days old, it ran swiftly but could barely fly. Of three remaining siblings in a nest on July 13, one was caught by hand 100 yards from the empty nest on July 15; at least seven days old, it ran swiftly but could not fly.

Some young flew strongly when 14 days old. A nest with six eggs on June 24 held four eggs and two newly hatched young on June 26, and six young on June 29 and July 1. The three youngest siblings (one dead) were in the nest on July 5, but the three oldest could not be found. The first or oldest sibling, however, was later shot 250 yards from the empty nest on July 10, when approximately 14 days old and flying strongly (*see* Specimens below). According to Wynne-Edwards (*ibid.*), longspurs do not fly before they are 12 to 14 days old.

Theoretically, longspurs hatching as early as June 24 should fly strongly by July 6–8. Apparently this was the case at Cambridge Bay in 1960, for a strong-flying juvenile flew a hundred yards before alighting on July 8. Newly fledged young were noted occasionally on the tundra between the bay and Mount Pelly during July 9–10; by July 11 they were common in many places.

They were everywhere common on July 15, at the beach as well as inland. Fledging was similar in 1962. A strong-flying juvenile was first seen that year on July 6.

Flight singing by males was conspicuous in late June but declined rapidly by July when breeding ended rather abruptly and finally, except for a few isolated cases. The last full flight display recorded at Cambridge Bay in 1960 occurred on July 4, and in 1962, on July 5.

The summer plumage of adults became worn and frayed during nesting. The moult in both sexes was noticeable in mid-July, and by late July it was extensive. Many adults lacked tails then. A female attending young in a nest as late as July 23, 1962, appeared not to be moulting, suggesting that the moult may be delayed in late-nesting individuals.

Moult in adults was still conspicuous in early August, but by mid-August many individuals looked like fall birds. The moult in some males was virtually completed in late August, but in other males and females it was not nearly completed. Some long-tailed juveniles were obviously moulting into first winter plumage in late July (*see* Specimens below). By August 18 some appeared to have completed the moult, ahead of adults.

Departure

Longspurs in the Cambridge Bay area did not flock early. Throughout August they were scattered for the most part, even while roosting among hummocks and boulders during the dim hours from 7:00 p.m. Family groups were not obvious.

Fall flocking was first noted in 1960 at Wellington Bay on August 26. Several flocks of upwards of a dozen birds each flew about in a marshy area near the beach then and on the following day. Many young and old individuals were scattered throughout the area, however. Flocking was not observed in the Cambridge Bay area up to the time of our departure on August 31.

In 1962, Sutton and Stephens observed flocking in the Cambridge Bay area on August 17 and days following. The flocks seen were not large, consisting usually of not more than a dozen birds. The species was still fairly common as late as September 9 but became scarce by September 12, indicating that a significant migration had taken place. Longspurs observed in September often fed and roosted in grassy, wet tundra areas. They did not fly about in dense flocks, but sprang up one by one or in scattered groups and soon alighted again. Longspurs were noted less often on the barren tundra.

Mortality

We noted little mortality among adult Lapland Longspurs. Predators (*see* Peregrine Falcon) probably accounted for some losses. Eskimo children near the settlement destroyed many nests, but on a population basis the loss was not significant. On two occasions we saw children with adult female longspurs that had been snared at nests.

Several longspur nests under observation were obviously destroyed by predators. We found evidence that Rough-legged Hawks and Snowy Owls

occasionally caught young longspurs, but predation by them was insignificant. The hoards of longspurs that fledged in the Cambridge Bay area in 1960 and 1962 were evidence enough of successful breeding.

Banding

Three nearly fledged Lapland Longspurs recently out of the nest were banded at Cambridge Bay on July 8, 1960.

Eighty-one nestlings were banded there in 1960: six siblings and five siblings on June 29; four siblings, five siblings, and four siblings on June 30; six siblings and five siblings on July 1; three siblings, six siblings, two siblings, and five siblings on July 2; six siblings, six siblings, and three siblings on July 3; one on July 4; five siblings on July 5; five siblings on July 12; four siblings on July 13.

Longspur 62-63631, banded as a nestling on July 1, was flying strongly when collected 250 yards from the nest on July 10 (*see* Specimens below).

In 1962, four male Lapland Longspurs (age not recorded) were banded at Cambridge Bay: two on August 29; one on September 3; one on September 6. One female (age not recorded) was banded on August 30. Two newly fledged juveniles were banded respectively on July 8 and 10. Nine nestlings were banded: five siblings and four siblings on July 6.

Specimens

Lapland Longspurs from Cambridge Bay and Jenny Lind Island are similar to *Calcarius lapponicus lapponicus* specimens from other parts of Canada. They are readily separable from a number of scattered specimens labelled *Calcarius lapponicus alascensis* in various collections. Although these latter specimens for the most part were not from known breeding areas of *alascensis*, they were believed to have been representative of that race.

Of 25 adult males, 15 were collected in 1960 at Cambridge Bay during May 31 to August 27. In 1962, seven were collected at Cambridge Bay during May 31 to August 20; one was collected at Augustus Hills on June 3; two were collected on Jenny Lind Island respectively on June 20 and 21. Weights (gm) and measurements (mm) of 23 specimens in summer plumage (May 31 to June 29): weight 27.0 to 32.0 (av. of 21: 29.04), wing chord 88.0 to 97.0 (92.3), tail 59.0 to 66.0 (62.45), bill from base of skull 11.7 to 13.4 (12.5), bill from anterior edge of nasal fossa to tip 8.0 to 9.9 (9.08), tarsus 20.0 to 24.0 (21.67). Weights and measurements of two specimens in fall plumage (August 20-27): weight 31.0 to 33.5, wing chord 92.0 each, tail 62.0 to 65.0, bill from skull 11.4 to 12.5, bill from nasal fossa 8.5 to 8.7, tarsus 20.5 to 22.5. The two birds collected in August had nearly completed the moult. Although the remiges of each were still partly sheathed at the base, they appeared to be full length. The plumage of the specimen collected at Augustus Hills is extensively white but not completely albinistic.

Of 12 adult females, nine were collected in 1960 at Cambridge Bay during June 2 to August 28. In 1962, two were collected at Cambridge Bay respectively on May 31 and July 7, and one on Jenny Lind Island on June 20. Weights and measurements of nine specimens in summer plumage (May 31 to July 7): weight 27.0 to 32.0 (av. of eight 29.5), wing chord 84.5 to 91.0

(87.38), tail 55.0 to 61.0 (58.55), bill from skull 10.6 to 13.0 (11.77), bill from nasal fossa 8.0 to 9.0 (8.44), tarsus 20.5 to 22.0 (21.77). Weights and measurements of three specimens in fall plumage (August 26-28): weight 25.0 to 28.0 (26.0), wing chord 81.0 to 89.0 (84.5), tail 57.5 to 61.5 (59.16), bill from skull 11.5 to 12.0 (11.83), bill from nasal fossa 8.0 to 8.5 (8.33), tarsus 20.5 each. The three specimens collected during August 26-28 were essentially in fall plumage, although they had not completed the moult.

Seven young males of various ages were collected at Cambridge Bay. Three [weight 29.5 to 32.0 (30.5), wing chord 94.0 to 96.0 (94.66), tail 66.0 to 67.0 (66.5), bill from skull 11.5 to 12.0 (11.66), bill from nasal fossa 7.5 to 8.0 (7.83), tarsus 21.0 to 22.0 (21.5)] in nearly complete first-winter plumage were collected during August 18-20, 1962. One (weight 33.0, wing chord 96.5, tail 67.0) was moulting into winter plumage when collected July 27, 1962; its head had many juvenal feathers. Two recently fledged young (wing chord 62.0 to 64.0, tail 29.0 to 30.0) in juvenal feather were collected on July 10, 1960, and July 9, 1962 respectively. One flightless young (wing chord 41.5, tail 10.0) in juvenal feather was collected on July 3, 1960.

Seven young females of various ages were collected at Cambridge Bay. One (weight 25.0, wing chord 84.0, tail 57.0, bill from skull 10.5, bill from nasal fossa 7.5, tarsus 20.0) had virtually completed the moult into first-winter feather when collected on August 18, 1962. One (weight 26.0, wing chord 88.5, tail 58.5) was well along in its moult when collected on August 9, 1960. One (weight 23.0, wing chord 88.0, tail 62.5) had much of its juvenal plumage when collected on July 28, 1960. Three flightless young (wing chord 61.0 to 64.0, tail 25.0 to 32.0) were in juvenal feather when collected respectively on July 8, 12, 1960, and July 9, 1962.

One recently fledged female (weight 24.0, wing chord 69.0, tail 36.0, bill from nasal fossa 6.8, tarsus 22.0) was 14 days old (banded previously at nest) when shot while flying strongly 250 yards from the abandoned nest on July 10, 1960. Very buffy above and below, it was typically a stub-tailed individual in juvenal feather.

Five sets with nests were collected at Cambridge Bay: in 1960, one with six eggs and one with five eggs on June 14, and one with six eggs on June 20; in 1962, two with six eggs each respectively on June 16 and 17. One nest (six eggs destroyed) was collected on Jenny Lind Island on June 23, 1962.

Annual Breeding Cycle

Mixed flocks of Lapland Longspurs arrive in southeastern Victoria Island in late May. The last flocks disperse early in June when pairs form and flight singing immediately becomes conspicuous. The favoured nesting habitat is hummocky wet tundra. Drier, well-vegetated slopes are also occupied. Egg-laying starts as early as June 9 and probably culminates in mid-June; it continues into late June and early July, exceptionally later. The clutch is commonly six eggs and five eggs, occasionally four eggs. Incubation by the female alone commonly starts before completion of the clutch, resulting in siblings of various ages. The period of incubation is 12 days. Since egg-laying

on a population basis is of long duration, there is overlap between laying of late eggs and hatching of the first young. Siblings leave the nest sporadically; they leave when a week to nine or ten days old and wander about the tundra for several days before flying. Young hatching as early as June 24 fly strongly 14 days later on July 8. Many young are in nests in early July when flight-singing by adult males ceases. Few young are in nests in mid-July. Eggs and nestlings are exceptional in late July. Most adults undergo extensive moult in late July when long-tailed juveniles are moulting into winter feather. Moulting individuals of various ages are everywhere common but scattered in early August. In mid-August many adults and young take on the appearance of winter birds, but the moult in adults is not nearly completed until late August, or later. Some young virtually complete the moult by late August, however. Longspurs mostly remain scattered throughout August, but some local flocking occurs from mid-August. The southward migration may take place largely before September 12, by which time the species may become scarce. Observations are lacking for later dates.

***Plectrophenax nivalis* (Linnaeus) Snow Bunting**

Snow Buntings (*Plectrophenax nivalis nivalis*) are only fairly common breeding birds in parts of southeastern Victoria Island. In other parts they appear to be uncommon. On Jenny Lind Island where suitable nesting habitat is limited to rocky coastal areas and ridges, they are locally abundant (see Supplement, p. 228).

Of all areas visited in 1960 and 1962, the rough land immediately enclosing Cambridge Bay contained the most buntings. The greatest density there was close to or within the settlement and military installations. Away from the disturbed areas their numbers quickly thinned, and many rocky ridges of the interior had few or no buntings. A few pairs bred on the slopes of Mount Pelly. The species was noted at Anderson and Wellington bays, but it was uncommon there even following the fledging of young. The basaltic islands of the Finlayson group appeared ideal for the birds, but relatively few pairs bred there.

In the mountainous and extremely sterile Glenelg Bay region of the north coast, the Snow Bunting was the only species of bird recorded during our brief visit in 1962. There, on June 8, we heard the songs of three birds coming from scree high up on a precipitous slope.

Previous Records

According to Amundsen's report of 1907 (in Schaanning, 1933), the first Snow Buntings of the year were observed in "Victoria Land" on April 16, 1905. Captain Joseph Bernard supposedly collected the species in the De Haven Point - Taylor Island area during 1917-19. Manning, *et al.* (1956) noted several flocks of Snow Buntings at Cambridge Bay on May 9, 1952. Ellis (1956) stated that flocks were present at Cambridge Bay in August of 1954. Fraser (1957) saw the species almost every day during his extensive travels in southeastern Victoria Island in 1955.

Arrival

The migration of Snow Buntings was virtually over by the time we arrived at Cambridge Bay in 1960 on May 31. A few small flocks were seen that day but none thereafter. Territorial behaviour was common then and on the days following.

Only a few males were noted the day of our arrival at Cambridge Bay in 1962 on May 10. Walks through the settlement and outlying areas during the following week convinced us that not many males were there in mid-May. Some males had already established territories, at times fiercely defended, which were abandoned before the arrival of the main body of buntings.

A few males probably had been in the area since mid-April. William Bock had seen a Snow Bunting there on April 16, 1961. It is a well-documented fact that small numbers of male buntings migrate early to many parts of the Canadian Arctic Archipelago.

The first flocks of significant size arrived in 1962 on May 19. The first female recorded was seen that day in a flock with seven males. Mixed flocks thereafter were common until the birds dispersed. Some flocks contained 20 to 30 buntings. The largest one seen contained at least 50 buntings (May 31). Transient flocks quickly passed through the area.

Mixed flocks were still conspicuous on June 1. By the following day they ceased to exist. Birds obviously paired were first seen on May 29, but they were uncommon until early June when display singing and territorial defence were fast approaching a peak.

Nesting

Snow Buntings in the Cambridge Bay area nested in stony places at the edge of the beach and inland along the ridges. In natural terrain the nest was almost invariably beneath loose rocks, sometimes below a single rock on relatively flat ground.

The buntings readily used artificial sites. A favourite site was an embankment of rock and peat that had been pushed into a pile at an excavation or roadside. Nests were also in rock-filled drums that supported wooden poles, or in rubbish, such as rusty cans. One nest was tucked away in the eaves of the Catholic Mission. According to Father Lemer, it had been used by the buntings in 1955, 1956, 1957, and 1958, but apparently not in 1959, although the birds had repaired the lining that year. It was not occupied in 1960.

On Jenny Lind Island where good sites were at a premium the buntings took advantage of the DEW-Line Station. On July 1 we checked two nests (one with five small young, the other empty) that were on steel cross beams at least ten feet above the ground. The only other nest found on the island was beneath a large boulder near the beach (six eggs when last checked on June 29).

The only nest seen anywhere on the Finlayson Islands was in a narrow crack in a precipitous sea cliff below a gullery and close to a raven's nest. The contents of the bunting nest, which appeared to be an old one lined afresh, could not be determined when checked June 21, 1960. The female repeatedly went to the nest but apparently was not yet incubating. In 1962

a male was seen entering the nest crevice as early as June 3. This was the only inaccessible bunting nest found by us in the whole region. Sites of this sort were common at the head of Frobisher Bay, Baffin Island, where many buntings breed.

Egg-laying at Cambridge Bay in 1960 probably started as early as June 9, for a nest contained four young at least a day old on June 26. Another nest, unlined on June 13, was finished by June 14 when the first egg was laid. The male of this nest was seen a number of times following the female to the site, but unlike his mate he failed to carry material. Another nest found on June 18 held seven eggs, indicating that egg-laying had started no later than June 11. Judging by the condition of eggs or by size of young in other nests, and according to the time of fledging of many young, egg-laying probably had reached a high point in mid-June, falling off sharply in late June.

The 1962 season appeared to be similar to that of 1960 with respect to the breeding schedule. A female seen building on June 10 laid her first egg on the 12th, the clutch being completed on the 18th. Another laid her first egg on the 15th, completing the clutch on the 19th.

Incubation started before the completion of the clutch, in some cases by the time the third egg appeared. At 11 Cambridge Bay nests believed to have had full clutches, the clutch size was five to seven eggs (average 6.27).

At a five-egg nest, the interval from the laying of the first egg (June 14) to abandonment of the nest by the last young (July 10) was 26 days; the youngest sibling, about nine days old, was not fledged. At a seven-egg nest, the interval from first egg (June 12) to last young in the nest (July 10) was 28 days; the young, about 10 days old, did not bolt when touched.

At another five-egg nest, the last young hatched on July 1. It left the nest when 10 days old but remained hidden beneath rocks close by. It was last seen standing in the open 30 feet from the nest, when 11 days old and not quite fledged.

Flying young of the year were first noted in 1960 on July 11. They were soon common in many places, and it was apparent that a good many young fledged about the same time in mid-July. By July 16 some adult males had abandoned the territory altogether and flocked in common defence of the young. Flocks of unattended juveniles were fairly common by July 21. A long-tailed juvenile was noted July 23, and within a week there were many.

A few nestings may have been tardy. Full songs were heard infrequently in early July, and fierce combat between two males occurred as late as July 13, but the collecting of a stub-tailed juvenile on August 4 was the only convincing evidence of a late nesting in 1960.

The breeding plumage of many adults was badly worn by mid-July. In late July, adults of both sexes were moulting heavily. A male noted August 1 was tailless; others could barely fly. Moulting of adults and juveniles occurred inland and near the coast. The rocky shores of the Greiner Lake river that flowed into Cambridge Bay was a favourite spot in 1960 for moulting buntings, especially adult males that commonly flocked there to feed and roost. The largest single flock of adult males seen then was one of nine birds (July 27).

The fresh winter plumage of the Snow Buntings was conspicuous in late August. The primaries of adult females collected during August 26-27 were not full length, however.

Departure

In 1960 we observed no migratory movements of Snow Buntings up to the time of our departure on August 30. Few flocks were seen even during late August, and these were invariably small and composed of local birds bent on feeding or roosting rather than migrating.

In 1962 the buntings were fairly common at Cambridge Bay well into September, but no large flocks of migrants were observed. Although our latest date for the species is September 12, a few buntings probably remain in the region until October or later.

Banding

Thirty-one flying Snow Buntings were live-trapped within the settlement of Cambridge Bay in 1962. Included were adults and juveniles of both sexes, but age and sex were not recorded in every case. We banded one bird on August 26, four birds on August 27, ten birds on August 28, nine birds on August 29, two birds on August 30, one bird on September 2, one bird on September 3, one bird on September 6, and two birds on September 8.

Thirty nestlings were banded near Cambridge Bay in 1960: four siblings on July 4; seven siblings on July 4; five siblings on July 5; four siblings on July 5; four siblings on July 5; six siblings on July 9.

Six nestlings were banded near Cambridge Bay in 1962: five siblings on July 10; a single bird on July 10. Bunting 22-145904, when approximately 60 days old, was live-trapped within 200 yards of its nest on August 28.

Specimens

Nineteen adult male Snow Buntings were collected: eight at Cambridge Bay in 1960 during June 6 to July 7; 10 at Cambridge Bay in 1962 during May 23-31; one on Jenny Lind Island on June 27, 1962. Weights (gm) and measurements (mm) of the 19: 32.0 to 41.0 (av. of 16 birds 35.53), wing chord 104 to 112 (107.68), tail 64.5 to 71.0 (67.34), bill from anterior edge of nasal fossa to tip 8.2 to 10.0 (8.9), tarsus 21.5 to 23.5 (22.44). The primary coverts of the Cambridge Bay specimens were pure white or immaculate (six birds), white with black tip (eight birds), and largely dark (four birds).

Nine adult females were collected at Cambridge Bay: eight in 1960 during June 6 to August 27, and one in 1962 on May 27. Weights and measurements of six (May 27 to June 11) in breeding plumage: weight 30.5 to 40.0 (35.5), wing chord 100 to 104 (102.0), tail 60.0 to 65.0 (63.16), bill from nasal fossa to tip 8.1 to 8.7 (8.28), tarsus 21.5 to 22.5 (22.0). Weights and measurements of one (July 26) in worn breeding plumage were: weight 32.0, wing chord 99.0, tail 61.5, bill 8.5, tarsus 21.0. Weights and measurements of two (August 26-27) in fresh autumn plumage were: weight 37.0 to 40.0, wing chord 91.5 to 96.5 (primaries not full length), tail 60.5 to 62.5, bill 7.8 to 8.4, tarsus 22.0 each.

Two fledged males were collected at Cambridge Bay: one large juvenile (wing chord 108, tail 71.0, winter feather obvious) on July 28, 1960; one smaller juvenile (wing chord 78.0, tail 44.0, typical juvenal feather) on July 15, 1962.

Five fledged female juveniles were collected at Cambridge Bay in 1960. Two (wing chord 101 to 102, tail 64.0 to 65.0) collected respectively on July 28 and August 9 were obviously acquiring the winter plumage. A somewhat younger bird (wing chord 97.0, tail 61.5) was collected July 28. Two (wing chord 82.0 each, tail 48.0 to 49.5) collected respectively on July 12 and August 4 appear to be of similar age; both were in typical juvenal feather.

One fledged juvenile (gonads destroyed, wing chord 105, tail 67.5) collected at Cambridge Bay on July 28, 1960, was acquiring the winter plumage. Its wing pattern was that of a female.

One set of seven eggs with nest was collected at Cambridge Bay on June 18, 1960.

Annual Breeding Cycle

A few male Snow Buntings return to southeastern Victoria Island as early as mid-April and establish territories which later may be abandoned. Many Snow Buntings in mixed flocks arrive chiefly in late May, the spring migration ending by June 1, or shortly thereafter. Pairing takes place in late May, but is not common until early June. Territorial defence and display singing reach a high point in early June and gradually decline during the remainder of the month, virtually ending in early July. The nesting habitat is rough country near the beaches or inland. Nests are constructed by the female beneath loose rocks as a rule, rarely in rock fissures, which are scarce in the region. A favourite habitat is a disturbed area, often near human dwellings or construction sites, where a variety of artificial nesting places are used. Old nests may be repaired and used four years in succession. Egg-laying takes place chiefly in mid-June, exceptionally earlier or later. The clutch size is five to seven eggs, averaging about six eggs. Incubation by the female alone may start with the third egg, resulting in siblings of different ages. Young hatch chiefly in late June. The interval from first egg to abandonment of the nest by the last young may be as short as 26 days. It may be longer at nests with a greater clutch; it may also be longer since the young buntings do not abandon the nest at a given age. Most young probably abandon the nest before fledging, hiding beneath rocks or debris close by. Later they may leave the nest crevice entirely and wander over the ground before fledging after 11 days of age. Flying stub-tailed young are common in mid-July. Most of them become independent some time in late July when their tails are full length or nearly so, and when the juvenal body plumage is being rapidly replaced with first winter feathers. Stub-tailed young in August are from late nestings, which appear to be uncommon. Territories are mostly abandoned by mid-July when adults flock in common defence of the young that are fledging. The adult plumage of both sexes is frayed in mid-July; in late July it undergoes extensive moult. Snow Buntings of all ages and both sexes moult near the beaches and inland, commonly along rocky streams. They are in fresh winter plumage in late August, but feather growth probably is not complete in adults before September. Juveniles may occur in the vicinity of the nest as late as August 28, when 60 days old and in winter feather. Adults and young remain in the area into mid-September, probably later, but fall flocking and migration are poorly known.

Hypothetical List

Totanus flavipes (Gmelin) Lesser Yellowlegs

A small flock of shorebirds at Cambridge Bay on August 16, 1954, was "very tentatively" identified as Lesser Yellowlegs by Ellis (1956) August 16, 1954.

Calidris minutilla (Vieillot) Least Sandpiper

We especially looked for Least Sandpipers, since Ellis (*ibid.*) tentatively identified one at Cambridge Bay in 1954, and since their eggs, supposedly collected at Cambridge Bay in 1853 by members of H.M.S. *Enterprise*, are listed in the catalogue of the collection of birds' eggs in the British Museum (Oates, 1902). Although we have not examined these eggs, they likely are referable to *Calidris pusilla*. We failed to find Least Sandpipers anywhere during the present study.

Calidris mauri (Cabanis) Western Sandpiper

This species was tentatively identified by Ellis (*ibid.*) at Cambridge Bay in 1954.

Turdus migratorius Linnaeus Robin

According to white residents of Cambridge Bay, two Robins were seen at the settlement early in May of 1955 (Fraser, 1957).

Mammals

With the notable exception of lemmings, the mammals of southeastern Victoria Island and adjacent small islands were as scarce as birds were plentiful during the summers of 1960 and 1962. Only one species of marine mammal was recorded, and even land mammals were disappointing when compared with those of high-arctic Ellesmere and Axel Heiberg islands. We did not search for mammals in general but did note their numbers and behaviour whenever they were encountered.

Arctic hares (*Lepus arcticus*) were not often seen by us but apparently are numerous at times. Solitary individuals were noted occasionally on the north slope of Mount Pelly in 1960 during June 16 to August 11. Conceivably, the same hare was seen each time. A solitary hare was also seen on one of the large, outer islands of the Finlayson group on June 21. Still another was seen on a rocky bluff near the sea a few miles west of Starvation Cove on August 28. All these individuals were large and greyish and were not easily approached. Residents of Cambridge Bay reportedly saw a number of hares near the settlement during the winter of 1961-62. We failed to find them there in 1962 following our arrival on May 10 but did note their recent tracks and droppings on ridges near the head of the bay before the thaw.

Varying lemmings (*Dicrostonyx groenlandicus*) are at times very abundant mammals of the Cambridge Bay area and probably in many places in the region where their numbers are highly cyclic. They were observed commonly in most types of habitats visited in 1960 but were especially characteristic of the dry tundra, including ridge tops. Their numbers were enormous during the summer of 1960 and probably peaked shortly thereafter. By the following spring, lemmings reportedly had crashed. So scarce were they in 1962 that we failed to find a live one anywhere, although the jaegers and owls were catching a few lemmings. Nesting success of Rough-legged Hawks, Pomarine Jaegers, and Snowy Owls was largely dependent on this species and the brown lemming. Specimens: 13 varying lemmings of different ages were collected at Cambridge Bay in 1960: a male and female in winter pelage found frozen below an owl perch respectively on June 3 and 5; four males in summer pelage and one very young male respectively on June 10, 20, July 3, 8, 12; four females in summer pelage respectively on June 1, 6, 10, July 8; two very young females respectively on June 10 and July 15.

Brown lemmings (*Lemmus trimucronatus*), also, are at times abundant in the region but are characteristic of wet tundra. Their cycles paralleled those of the varying lemming with respect to peaks and lows, being common in 1960 and very scarce in 1962. Except for a single young lemming caught near Greiner Lake by an Eskimo, we failed to record brown lemmings

anywhere in 1962. Specimens: six brown lemmings of various ages were collected at Cambridge Bay; four males in 1960 respectively on May 31, June 1, 29, July 4; one very young male in 1962 on June 13; one female in 1960 on June 24.

Wolf (*Canis lupus*) records from any source appear to be scarce for the region. On high land several miles north of Greiner Lake, we found fairly fresh tracks of a medium-sized individual on May 19, 1962. The tracks headed in the direction of Mount Pelly.

Arctic foxes (*Alopex lagopus*) are trapped in large numbers all along the southeast coast of Victoria Island and on Jenny Lind Island following good lemming summers. We observed very few foxes in 1960 but did find a den halfway up the southeast slope of Mount Pelly. An adult, and later, an undetermined number of pups were noted there during July 10 to August 3. Many successful litters that summer produced a bumper crop that was harvested the following winter. Foxes were scarce again by May of 1962 when we occasionally noted their tracks and diggings on the snowy tundra between Cambridge Bay and Mount Pelly.

Polar bears (*Thalarctos maritimus*) were not observed anywhere by us, and they are seldom seen in Dease Strait or western Queen Maud Gulf. They are reportedly abundant in Albert Edward Bay and further east in Victoria Strait, and a few Eskimos hunt there in spring before the thaw. This area includes the frozen seas near Jenny Lind Island where two bears were shot some time during the winter of 1961-1962.

Ermine (*Mustela erminea*) in summer pelage were seen occasionally in the Cambridge Bay area throughout the summer of 1960 and probably were much more abundant than our records indicated. Several observations that year were noteworthy. At one of many owl mounds (*see* Snowy Owl, p. 172) near Cambridge Bay on June 7, we watched a solitary ermine repeatedly go to its den in several layers of loose rock. The then empty nest was a ball of lemming fur containing bits of dried flesh and bones. Two whole lemmings lay close by. On June 26 we came upon a most unusual concentration of ermine that were catching and devouring on the spot the many varying lemmings that occupied a small hill near the head of Cambridge Bay. Ermine kept popping in and out of numerous burrows where the lemmings attempted to hide. Nine popped out at once, but there must have been twice that number, perhaps more! This particular hill and its lemmings were familiar to us, for we routinely crossed the place in visiting marked bird nests. Ermine were not seen there previously; nor were they found anywhere within a half mile of there during intensive searches on days following. In removing surface peat and loose rock, we uncovered a dozen or so lemming remains—each a little pile of fur and an untouched cecum. No lemmings were seen on the hill thereafter. Ermine reportedly were seen on occasion within the settlement by white residents not only in 1960 but also in 1961. Far west of Cambridge Bay we noted one ermine many miles inland at approximately 69°18' N, 111°32' W on August 8, 1960. None was seen anywhere by us in 1962. Specimens: three ermine were collected at Cambridge Bay in 1960: one male on August 13; two females respectively on August 19 and 20.

Ringed seals (*Phoca hispida*) are hunted regularly in spring and summer by the Eskimo. The greatest number of seals noted by us were in Dease Strait near the Finlayson Islands and in Anderson Bay of Queen Maud Gulf.

Barren-ground caribou (*Rangifer arcticus*) antlers and bones widely scattered throughout the Cambridge Bay area are a grim reminder of the magnificent herds that at one time annually crossed over from the mainland. No live caribou were seen anywhere by us on Victoria Island, but Barry noted a small group during a flight to Hadley Bay on August 9, 1960. These caribou may have been *Rangifer arcticus pearyi* or intergrades *pearyi* > *arcticus* (see Manning, 1960).

Muskox (*Ovibos moschatus*) occur in small numbers on Victoria Island; one reportedly was seen by white personnel stationed at Sturt Point during the summer of 1960. A very old muskox skull was found near our camp at the foot of Mount Pelly on June 16, 1960.

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SUPPLEMENT

NARRATIVE

The senior author, accompanied by George Miksch Sutton, Dale W. Greiner, and Walter Graul, left Edmonton, Alberta, on May 28 and arrived at Cambridge Bay the same day. While waiting for a flight to Jenny Lind Island, we visited the country just beyond the head of the bay. On our arrival at Jenny Lind Island on May 31 we set up a base camp near the DEW-Line Station, which we maintained until August 12. Most of the eastern half of the island we visited during the summer, but the principal study area was a mile-wide stretch of tundra that dropped gently northward from the station to a great marsh with numerous lakes and marshy ponds. Visited frequently were the rocky shores and sandy beaches of the east coast. On June 16 the senior author and party left Jenny Lind Island and flew south to Kangowan Lake ($67^{\circ}15' \text{ N}$, $100^{\circ}15' \text{ W}$), about forty miles inland from the mainland coast west of Simpson River. They accompanied John P. Ryder to a large colony of Ross's Geese, and observed firsthand some of the shorebirds of the area. Return flight to Jenny Lind Island on June 17 was made by way of the Perry River. The senior author and party left Jenny Lind Island on August 12, and Cambridge Bay on August 15.

Climate

Mean daily temperatures during summer on Jenny Lind Island (based on weather data from 1962 through 1966) average a few degrees cooler than at Cambridge Bay. The mean daily temperature for July is only 42°F and approaches high-arctic conditions. Above-freezing temperatures from as early as May 13 in 1966 probably resulted in an exceptional thaw. Mean daily temperatures were above freezing for May 26, 28, 29, 30, and included a maximum daily high of 41 degrees on the 29th. Despite the cool temperatures that followed in early June (mean daily only 26 degrees on the 3rd), the thaw advanced rapidly and provided a favourable climate for birds. Shore leads along the coast were barely visible on June 10, but by the 21st they were wide open at the head of certain bays. Summer precipitation is similar to that of Cambridge Bay. The precipitation for June (0.51 inches in 1966) was slightly above average (based on data from 1962 through 1966), but slightly below average for July (0.56). August was unusual in that precipitation reached 2.44 inches by August 12; 2.24 inches had fallen during a two-day period (August 11–12). Foggy spells were frequent and usually accompanied northerly winds. The most troublesome period was late July and early August when the sea was mostly free of ice.

Specimens

One hundred and sixty-three birds (representing 39 species), 14 egg sets with nest material (nine species), two pipped eggs (two species), 13 small mammals, and 81 plant specimens were collected on Jenny Lind Island in 1966.

Systematic List of Birds

The following pertains only to birds studied on Jenny Lind Island in 1966.

Gavia adamsii (Gray) Yellow-billed Loon

The species was noted occasionally in 1966: pair swimming inland (June 7); one in coastal shore lead (June 22); one flying inland (July 5 and 7); one swimming inland (July 10).

Gavia arctica (Linnaeus) Arctic Loon

The species arrives as early as June 9 (one bird inland) on Jenny Lind Island where it nests in precisely the same type of habitat used by Red-throated Loons. Nests of the two species were observed on adjacent ponds separated by only a narrow strip of marsh tundra. The single egg (no embryo within) of a nest first seen on July 1 was incubated as late as August 8. Small young were capable of crossing land. One downy left the nesting pond and crossed 98 yards of marsh tundra to a larger pond. A fairly small downy male was collected July 28.

Gavia stellata (Pontoppidan) Red-throated Loon

These loons were looked for but not seen anywhere on Jenny Lind Island before June 20 when they suddenly became numerous inland and along the coast. Some pairs established themselves at nesting ponds soon after arrival. Others flew about for many days before settling down. Quite a few seemingly paired birds frequented nesting areas but did not breed. Egg-laying on a population basis was not synchronized. It commenced in late June and continued into late July. Eggs laid in late July were still being incubated by the time we departed on August 12. The clutch was one or two eggs. Approximately two days elapsed between laying of the first and second eggs of one two-egg clutch. Incubation by both sexes commenced with the first egg. The period of incubation for the last egg of one clutch was 24 days and 20 hours (error not greater than four hours); for another it was 26 days (error not greater than three hours). As many as seven pairs bred in one square mile of marsh tundra in 1966. The two closest nests seen were 150 yards apart. Two downy young were collected: a male (weight 55.9 gm, exposed culmen 9.5 mm, tarsus 22.5 mm) on July 26 when only a few hours old; a female (age uncertain) on July 25.

***Olor columbianus* (Ord) Whistling Swan**

A single swan was noted by Eskimo Ahagona on May 30. We first noted a pair inland on June 7. At least ten pairs were observed in the eastern half of the island, but most of them did not breed successfully. A pair with four cygnets, perhaps a week old, was seen near the centre of the island on June 19. Subsequent search in the interior disclosed two additional pairs with four young each.

***Branta canadensis* (Linnaeus) Canada Goose**

Pairs were already establishing territories by the time we arrived at Jenny Lind Island on May 31. Some pairs nested early. Others roamed for many days before settling down, and some never did settle. Nests with two, four, and five eggs each were found as early as June 6—our earliest egg date for the race. Layings in late June were not recorded as in 1962. Probably no more than seven pairs bred in a square mile of the best habitat in 1966. The old scrapes were scratched clean and lined afresh after laying of the first or second egg. Of 33 nests observed, the apparent clutch for 12 was: three eggs (one nest), five (two nests), six (six nests), seven (two nests), and eight (one nest). The period of incubation was not determined precisely, but eggs at several nests hatched during a 26- to 27-day period. Some eggs hatched during July 4-5. Many hatched during July 9-10 but few thereafter. At some nests the goslings were brooded for more than a day following hatching. A brood of seven, having moved at least a hundred yards, returned hours later to the nest to be brooded. Adults with small young quickly abandoned the nesting ponds for lake areas in the remote interior; some went to the marine beaches. A male banded 558-78712 by the Nebraska Game Commission at Lewellen on January 25, 1965, was shot by Eskimo Ahagona on Jenny Lind Island on June 17, 1966 (specimen preserved). A partly decomposed female found by Greiner on August 8 had been banded 697-46458 by A. Dzubin in the Kindersley area of Saskatchewan on October 5, 1962. One downy male (weight 74.8 gm, exposed culmen 15.0 mm, tarsus 27.5 mm) was collected at a nest July 9.

***Branta bernicla* (Linnaeus) Brant**

The Atlantic race (*Branta bernicla hrota*) appears to be a casual visitor to Jenny Lind Island where nesting occurred in 1966. The species was first seen flying near the east coast on June 23 (flock of three and a solitary bird). Two standing at the edge of a marshy pond on June 25 were the only ones seen inland. They may have been the very birds that nested on the east coast in July. The nest, a slight pad of down and feathers on bare stones of a gravel bar, was only a few inches above high tide at the edge of the sea. So far as is known, no comparable nesting site is used by *nigricans* in southeastern Victoria Island. The adult female and its nest and four nearly fresh eggs were collected July 13. Black-bellied Brant were noted by Gaul on June 11 (flock of nine inland) and June 19 (pair inland). However, we feel certain that these or other *nigricans* did not breed in eastern Jenny Lind Island in 1966.

Anser albifrons (Scopoli) White-fronted Goose

A small number of these geese visited Jenny Lind Island in 1966: two pairs and a single (June 5); one pair, and a single with a Canada Goose (June 6); flock of three, and two pairs (June 7); two with a Canada Goose (June 9); one pair (June 1); single with a Canada Goose (June 13); flock of four (June 25). It seems likely that a few bred somewhere on the island that year.

Chen caerulescens (Linnaeus) Snow Goose

The species was not seen before June 4 (two pairs). Migration into the area occurred as late as June 9. Blue-phased birds constituted about nineteen per cent of the total Snow Geese seen. Of 34 pairs observed in eastern Jenny Lind Island, 25 pairs were white-phased, four pairs were blue-phased, and five pairs were mixed. The apparent clutch of nine pairs (both phases included) varied from three to seven eggs (av. 4.7 eggs). Twenty-three or more pairs bred at a small but prominent ridge far inland on a broad plain not visited in 1962. Atop the ridge in the middle of the colony was an active nest of a Snowy Owl. Some of the geese nested successfully on the ridge within a few yards of the owls, but most pairs were scattered over the rocky slopes below the ridge. Many geese were incubating when first seen there on June 15. Others were completing their clutches. Hatching at some nests had taken place by July 5. All geese had abandoned the nesting ground by July 18. Isolated pairs were dispersed widely from the edge of the sea to the tops of high ridges. The nest of a solitary pair held two eggs on June 8. The third and final egg laid on June 9 hatched 23 days and 15 hours (error not greater than two hours) later, July 2. Pipped eggs occurred as late as July 10. Adults with young occupied lake areas deep in the interior, and only occasionally did we see them near the coast. Three downy young were collected: a newly hatched male of white-phased parents on July 2; male and female siblings (age uncertain) from a mixed pair on July 15. One set of four eggs and down of blue-phased birds were collected June 24.

Anas acuta Linnaeus Pintail

A pair was seen inland on June 7, but no real evidence of nesting was found. From one to six drakes were noted inland occasionally, from June 8 to August 5. From a flock of six flightless drakes, first seen July 17, one was collected (July 20). A flying flock of 26 birds at the coast on August 6, one of 12 birds inland on August 8, and flocks of three and seven birds flying at the coast on August 8, were probably all drakes, many in dull plumage.

Anas carolinensis Gmelin Green-winged Teal

A lone drake was seen inland by Graul on June 7.

Clangula hyemalis (Linnaeus) Oldsquaw

These ducks arrived at the partly open ponds on June 6 (seven birds, including two pairs). From that day, singles, pairs, and small groups could be found most any time, the species being noticeably more abundant than in 1962. All seven eggs at one nest hatched July 18. A brood of seven seen

earlier that day was the first recorded by us in 1966. A fair number of broods were noted thereafter. The largest nurseries seen included one of 23 young attended by two adult females, and one of 22 young and 20 females (August 4). Drakes commenced flocking in late June. Most had abandoned the breeding areas by July 11. One adult female was banded July 18. One newly hatched female was collected July 19.

***Somateria mollissima* (Linnaeus) Common Eider**

These eiders were not so abundant as they were in 1962. Pairs were noted occasionally from June 7. Three nests found near the beaches of the rocky east coast had been previously destroyed by predators. One nest with four eggs on June 30 and four young (two collected) on July 19 was a mile and a half from the sea on a hummocky, vegetated slope. Nesting far from the sea may not have been exceptional, for several pairs were seen well inland. Unemployed females fraternized commonly with unemployed King Eider females inland and at the coast.

***Somateria spectabilis* (Linnaeus) King Eider**

Although two drakes and a hen were noted inland as early as June 6, these eiders were not common until June 13. Fifteen nests were observed. The first seen held two eggs on June 22. One nest was at the edge of a pond. Two nests were only 17 yards apart. The apparent clutch at nine nests varied from three to six eggs (av. 4.2 eggs). The fifth and last egg of a clutch laid June 28 hatched 23 days and two hours (error not greater than four hours) later, July 20. Eggs of another clutch were laid at one-day intervals, the fourth and last egg laid June 27 hatched 23 days and 17 hours (error not greater than seven hours) later, July 20, all four eggs hatching within an eight-hour period. Drakes were last seen inland on July 5. Twenty-two drakes flying together along a coastal shore lead on July 12 were the last seen that year. Three incubating females were banded during July 18–20. The following specimens were secured: one adult male (June 13), one adult female (June 18), one newly hatched female (July 26).

***Buteo lagopus* (Pontoppidan) Rough-legged Hawk**

We saw a light-phased individual several times during June 2–5 on the island where we had failed to find the species in 1962. An old nest on a rocky ridge overlooking a broad coastal plain clearly showed that the species had bred on the island previously.

***Falco peregrinus* Tunstall Peregrine Falcon**

A single bird flying inland on June 8 was the only one of the species recorded by us for Jenny Lind Island. There is some doubt concerning the identity of a falcon reportedly captured by an officer of the United States Air Force on the island in 1961.

***Lagopus lagopus* (Linnaeus) Willow Ptarmigan**

Only a few widely scattered males were noted in 1966.

Lagopus mutus (Montin) Rock Ptarmigan

Only a few pairs were noted in 1966. The female of a pair collected June 13 had a hard-shelled egg in the oviduct. A pair with eight fledged young was first observed on July 20; another pair with 10 fledged young was first seen July 26.

Grus canadensis (Linnaeus) Sandhill Crane

Again we failed to find cranes, although Eskimo Ahagona insisted that he saw one near the east coast on about May 28, and one in the same area on June 12.

Charadrius semipalmatus Bonaparte Semipalmated Plover

The species was first recorded on June 2 (performing male). Two pairs bred in the artificial environment of the station. The fourth egg of one clutch laid June 23 hatched 24 days and 13 hours (error not greater than two hours) later, July 17. Both sexes had incubated the eggs, all of which hatched within a period of a few hours. Three pairs bred in widely separated areas near the beach of the east coast. The following were banded: one adult (June 30); three newly hatched siblings (July 17); one downy of uncertain age (July 23); three 'downy' siblings (July 24); two nearly fledged siblings (August 7).

Pluvialis dominica (Müller) American Golden Plover

A lone male was first seen on June 1, a pair on June 4. Flight displays were conspicuous from June 5. As in 1962, these plovers favoured the higher slopes. Some young hatched July 7-8, indicating egg-laying as early as June 8. Others hatched July 17-18, indicating egg-laying as late as June 20. Both sexes attended young. Single adults that flew about with fledged young were thought to be males. Flocking by adults occurred inland as early as July 24 (six birds) and continued until August 12 when we departed. All these birds were piebald. Nine small young were banded during July 16-21. One adult male was collected June 15. A nearly six-day-old male (weight 30.0 gm, exposed culmen 15.0 mm, tarsus 37.5 mm) was collected July 12 only a few hundred yards from where it had been banded at the nest on July 7. It had no visible incoming juvenal feathers; its wing quills were barely visible; colours of soft parts were: eyes dark brown, bill black, legs and feet dark greyish brown.

Squatarola squatarola (Linnaeus) Black-bellied Plover

The species was first noted June 4 (one male). Flight displays started June 6. Displaying males used the deep wing beat as well as the shallow and often flew long distances in this manner. By June 12, pairs were conspicuous in many places where density was three to six pairs to a square mile. The first nest seen held one egg on June 18. Eggs were laid at one- to two-day intervals. Both sexes incubated early and late in the period. Most young hatched in mid-July. Three siblings of a late nesting hatched July 26; the fourth sibling hatched two days later on July 28. The incubation period for the last egg was at least 27 days. Asynchronous hatching of a brood was the

rule. However, four siblings hatched in less than a 16-hour period indicated that incubation occasionally commences about the time the last egg is laid. A repeated nesting resulted in an unusually late clutch that was completed on July 8—our latest date for a fresh egg of the species. These eggs were abandoned shortly after July 25, despite the fact that they contained large embryos. Forty-two adults and young were banded June 30 to August 8. The following were collected: adult male, June 8; a large but flightless female juvenile, August 7; two downy males, July 18–22; a five-day-old male (weight 32.2 gm, exposed culmen 15.5 mm, tarsus 37.0 mm), July 18. The bird of known age had no visible incoming juvenal feathers; its wing quills were barely visible; its eyes were dark brown; its bill, legs, and feet were greyish black.

***Arenaria interpres* (Linnaeus) Ruddy Turnstone**

None was seen before June 3 (male inland). Pairs were first noted inland on June 7. Egg-laying started in mid-June and continued into late June. A newly hatched chick was first observed July 6; one was last observed July 14. Some juveniles were flying strongly by July 28. A few adults with juveniles were noted inland as late as August 4 and at the marine beaches as late as August 6. Juveniles were common at the beaches by the time we departed on August 12. Fifty adults and young were banded June 23 to July 30. Five of the banded young were collected July 15 to August 8. One banded at the nest on July 14 was crippled at a marine beach two miles away on August 5 when it was fully fledged and unattended; it was collected (by Graul) at the same beach on August 8 when 25 days old. In addition, the following were collected: adult male, June 22; two sets of four eggs each with nests, June 21–22.

***Calidris canutus* (Linnaeus) Knot**

The species was first observed June 7 (one bird inland). A few flight displays were noted during June 9–15. A full flight display was last observed June 28. Calls were heard infrequently throughout July and early August. Pairs appeared to be slightly more abundant than in 1962. Small young found by Graul on July 9 indicated that egg-laying had taken place in mid-June. The four siblings (collected with male parent) appeared to be of slightly different ages, suggesting asynchronous hatching of the brood. Another brood (at least three siblings, one collected) was found in the same area on July 13. One banded that day was caught again on July 18 with an unbanded sibling (banded July 18). The flightless young and male parent had moved two miles across tundra containing myriads of marshy ponds. No doubt single males with broods roam considerably before fledging time. Flying juveniles were first noted inland on July 25 (two birds). One adult, believed to have been a male, flew with them. Adults with juveniles were seen at the marine beaches during August 6–8. Two (collected) of a dozen noted there on the 6th proved to be males. The largest number of juveniles noted occurred August 8 (estimated 50 birds). Likely some were from afar.

***Calidris melanotos* (Vieillot) Pectoral Sandpiper**

The species was first noted June 3 (one male). Flight displays were noted infrequently from June 6. Flocking by males was first noted July 2. Fledged juveniles were first noted July 24. Small numbers of them flocked inland during August 2-12. An adult female was collected July 12.

***Calidris fuscicollis* (Vieillot) White-rumped Sandpiper**

None was seen before June 2 (three birds). Displaying males were first noted June 5 and by the following day were common in many places. The breeding population was not so dense as it was in 1962. The sexes appeared to be equal in numbers. We found no evidence of polygamy. Egg-laying started in early June. On a population basis it reached a peak in mid-June. The incubation period for the last egg of one clutch was 22 days and one hour (error not greater than 45 minutes). All four siblings from this clutch hatched within a period of 65 minutes, indicating that incubation had commenced following completion of the clutch. At other nests incubation had commenced some time between laying of the third and fourth eggs. Young in nests were observed during July 1-10. Adult males became scarce in early July and were last seen on the 11th. Adult females (marked at nests) alone incubated the eggs and attended young. Some females with broods remained close to the original nesting sites until fledging time; others moved to new areas more than a mile away. Juveniles 15 days old flew weakly. When 17 days old they flew strongly, some as early as July 18. Fledged young remained inland for a few days before going to the marine beaches. Few adult females followed them there. Hundreds of juveniles were at the beaches during August 2-10. Sixty-four adult females and young were banded June 22 to July 19. The following were collected: adult female, July 9; ten juveniles of known age, July 7 to August 1; three sets of four eggs each with nests, June 24-26. Data on juveniles of known age will be published separately.

***Calidris bairdii* (Coues) Baird's Sandpiper**

The species was first noted June 2 (flock of four birds; displaying male). Egg-laying on a population basis commenced in early June and reached a peak in mid-June. Most young hatched in early July, a few in mid-July. A nest with three newly hatched young and a pipped egg as late as July 23 was exceptional and may have represented a repeated nesting. Eggs of a clutch were laid at 29- to 31-hour intervals. The incubation period for the last egg of a clutch was 21 days (error not greater than seven hours). Both sexes (marked at nests) attended the eggs throughout the period. Both attended young during the first five days following the hatching, after which time females were not recorded. Only single adults were seen with large young. Each of four adults that attended young singly proved to be a male when collected. Thirty adults and young were banded June 27 to July 23. One strong flying juvenile of known age (banded with three siblings July 6) was collected July 26. The single, unbanded adult male (collected) that alone defended this juvenile was not its parent, for the true parents had been banded with the brood on July 6. The following were collected: five adult

males, July 21-29; two fledged male juveniles, August 2-7; three fledged or nearly fledged female juveniles, July 21-26; a downy male, July 26; one pipped egg, July 1; one set of four eggs with nest, June 15.

***Calidris pusilla* (Linnaeus) Semipalmated Sandpiper**

These sandpipers were first noted June 2 (three birds). Many males displayed on June 5, and from that date the species was the commonest scolopacid on the island. Although egg-laying on a population basis started by June 9, it took place mostly in mid-June and late June. The clutch at 23 nests was four eggs; at three nests it probably was three eggs. Incubation periods for three nests were: 19 days and seven hours (error not greater than four hours); 19 days and one hour (error not greater than 2.5 hours); 19 days and three hours (error not greater than 18 minutes). At a number of nests incubation had commenced a few hours before or soon after laying of the fourth egg. Both sexes (marked at nests) incubated eggs and attended young throughout the fledging period and for a time following fledging. Some juveniles flew strongly when 14 days old. No doubt some flew as early as July 14, since hatching started as early as July 1. Fledged juveniles, conspicuous in late July, remained inland a number of days before going to the marine beaches. Hundreds were at the beaches during August 3-8. An attending female collected inland on August 1 was the last adult recorded. One hundred and ten adults and young were banded June 27 to July 27. The remains of a banded 13-day-old juvenile was recovered from the alimentary canal of a Parasitic Jaeger. One 28-day-old young was collected (August 3) at the beach about two miles from where it had hatched (July 6). The following were collected: adult male, July 28; adult female, August 1; two female juveniles, July 28 to August 4; 12 young of known ages, July 8 to August 4; one pipped egg, July 14; two sets of four eggs each with nests, June 21-23. Data on young of known ages will be published separately.

***Micropalama himantopus* (Bonaparte) Stilt Sandpiper**

Arrival was rapid, and many males displayed soon after the species appeared on June 2 (six birds). Pairs were more numerous than in 1962. A well-feathered young on July 11 indicated early egg-laying by one pair. Other pairs nested late, for hatching took place as late as July 12. In marking certain pairs at nests, it was clear that both sexes shared equally the task of incubation. When not incubating, the male flew about like an unattached bird and even performed flight displays. Both sexes attended small young. Single adults rather than pairs attended large young. These proved to be males, some of which attended young other than their own. Some young probably fledged as early as July 15. Flying juveniles were conspicuous inland in late July and early August. They occurred at the marine beaches during August 2-10, as many as fifty at one time on the 5th. Adults became scarce in late July, the last observed being on the 27th. Twenty-six adults and young were banded June 29 to July 21. The following were collected: three adult males, July 11-27; adult female, June 20; five young of various ages, July 4-28. A 10-day-old male (weight 17.5 gm, wing chord 53.0 mm, exposed culmen 20.5 mm, tarsus 34.5 mm) was collected (July 22) with its

banded male parent about 1.5 miles from the nest which had been abandoned since July 12. Its incoming juvenal plumage was conspicuous only on back and sides; its eyes were dark brown, its bill brownish olive, its legs and feet olive.

Tryngites subruficollis (Vieillot) Buff-breasted Sandpiper

The species was uncommon in 1966. We failed to note it anywhere before June 18 (one bird inland). In those areas where the species had been so abundant in 1962, we found no more than five birds at any one time throughout late June and early July. Both sexes occupied marsh and wet tundra areas during the courtship period. Females, however, retired to higher, drier slopes to lay eggs. This accounts for our failure to find nests in wet tundra in 1962. Broods and attending females were scattered widely over the dry slopes; some later moved into wet areas. Attending females were conspicuous. Characteristically, they circled low, alighting here and there, calling frequently. The call (recorded on tape) was a soft *quip*, occasionally *chew*, and rarely *quip-chew*. Flocking by males in the breeding areas commenced in early July and was conspicuous in mid-July. Only a few scattered individuals or twosomes were seen in early August. None of these birds attended young. The following were banded: female and three downy young, July 21; three downy young, July 27. The following were collected: adult male, July 17; female and four recently hatched chicks, July 21; a nearly fledged female, August 3; a small downy female, July 25; set of four eggs with nest, July 12. A recently hatched downy weighed about 9.0 gm; its exposed culmen was about 8.5 mm long, its tarsi about 23.5 mm long; its eyes were dark brown; its bill olive grey; its legs and feet grey; its heels yellowish. Bills of slightly older young were olive with a distinct black tip, a condition which persists beyond fledging. The legs and feet of slightly older young were yellowish grey, being brightest on the rear edge and soles; those of still older young were dull yellowish with dark markings on heels.

Crocethia alba (Pallas) Sanderling

A mixed flock of 13 Sanderlings at a marshy pond area two miles inland on June 7 was the first noted. The birds were active and noisy, but no special displays were observed. Widely scattered pairs, invariably a bright male and a dull female, were seen in various habitats during June 11-15. We failed to find a pair more than one time in a particular area, however. One nest—a depression lined chiefly with dry willow leaves, a few lichens, and bits of other plants that grew close by—held four fresh eggs on June 24. It was on a gentle slope overlooking lakes and marshy ponds. The slope, including the ground all about this nest, was dry and exposed except for a scattering of plants. The bird feigned a little when flushed from her eggs. She ran close to the nest with feathers somewhat elevated and emitted single notes (recorded on tape) that were loud and not unlike chirps of a baby bird. In observing this nest for 22 consecutive hours, we concluded that the female alone incubated the eggs. She was on the eggs almost continuously during the cool hours from late afternoon to 7:30 A.M., after which time she left the area for long periods. Although she did not hesitate to catch insects

near the nest, she fed mostly at a lake shore a quarter mile away. We found no other evidence of nesting. Mixed flocks of a few to upwards of six unemployed Sanderlings were seen occasionally at lakes from July 12 to August 2. Adults were at the marine beaches during August 3-10, as many as 30 on the 6th, and 50 on the 8th. A juvenile was first seen there August 7. The following were collected: two adult males at marine beaches, August 3-4; female with nest and four eggs, June 25; male juvenile at beach, August 10.

***Phalaropus fulicarius* (Linnaeus) Red Phalarope**

The species was first noted June 11 (two pairs inland) and was common from June 13. The incubation period for the last egg of one clutch was 18 days and 17 hours (error not greater than 5.5 hours); at another it was 18 days and nine hours (error not greater than 3.5 hours). Adult females were last seen July 11. Attending males abandoned even small young for hours at a time. Older young were on their own much of the time. Juveniles commenced flying when about 18 days old. Flying young were conspicuous inland throughout early August. A few adults were inland as late as August 10, but they were indifferent to juveniles near by. A few adults and unattended juveniles fed in open waters near the marine beaches during August 3-8. Fifty adults and young were banded June 29 to August 2. Six banded young were collected in the nesting area July 25 to August 2. A 10-day-old male (weight 18.1 gm, exposed culmen 11.0 mm, tarsus 19.0 mm) was mostly downy when collected July 29; its juvenal feathers were conspicuous only on back and sides; its wing quills were minute. A 17.5-day-old female (weight 32.7 gm, wing chord 84.0 mm, tail 34.0 mm, exposed culmen 16.0 mm, tarsus 21.0 mm) was flying weakly when collected July 30. Although its juvenal plumage was well developed, down was still conspicuous at base of bill, neck, and rump. Juveniles with wing chords 93.0 mm or longer flew strongly.

***Lobipes lobatus* (Linnaeus) Northern Phalarope**

A group of marshy ponds that had no Northern Phalaropes in 1962 was occupied by at least six of them in 1966. The birds arrived late. The first seen was a female (collected) on June 22. Pairs were noted from June 24 through July 1; thereafter, only males were seen until July 23 when small young were first recorded. At a particular marshy pond where nesting had been suspected since early in July, Graul and Greiner collected a male and four young that were not long out of the nest on July 23. The downy young (weight of male 4.0 gm, exposed culmen 7.5 mm, tarsus 17.0 mm) were probably not much more than a day old. The nesting of this low-arctic species was remarkable in that it occurred within a mile of the nestings of such high-arctic breeders as Knots and Sanderlings. Red Phalaropes nested commonly at those marshes where the Northern Phalaropes bred. Northern Phalaropes probably bred sparingly at other lake areas on Jenny Lind Island in 1966. A male behaved as if young were present near the centre of the island on July 19. Two fledged juveniles (female collected) swam in the open waters near the beaches of the east coast on August 3.

***Stercorarius pomarinus* (Temminck) Pomarine Jaeger**

These jaegers returned to Jenny Lind Island in 1966 when lemmings were moderately abundant. A few solitary individuals and small flocks were noted almost daily during June 1–15. From one to three birds were seen occasionally from June 21 to August 5. At no time that year did we observe territorial defence.

***Stercorarius parasiticus* (Linnaeus) Parasitic Jaeger**

The species was somewhat more abundant in 1966 when pairs bred one to two miles apart. One individual was seen inland on June 6. Pairs were fairly common by June 15. Egg-laying probably started in mid-June, for hatching occurred as early as July 13. Laying at some nests took place in late June. Young from eggs first seen on June 23 hatched during July 17–18. Although the incubation period at this nest was not determined precisely, it was at least 25 days long. In banding and dyeing a male at its nest, we were able to follow some of its movements. When not incubating, this individual ranged at least two miles from the nest. Parasitic Jaegers ate a variety of food other than lemmings. During June and early July they competed with the foxes for eggs. In mid-July and late July they hunted chicks relentlessly. Some visited the open waters off the east coast. An adult collected at its nest in mid-July had eaten a six-inch fish that had come from the sea. One dark-phased individual was seen occasionally during the summer. Three downy young were colour banded (yellow) July 17–18. The following were collected: two adult males, June 29 to July 16; adult female, July 14; a one-day-old female, July 14; set of two eggs with nesting material, June 29.

***Stercorarius longicaudus* Vieillot Long-tailed Jaeger**

The species was first noted June 6 (one bird). An adult male was collected June 10. Pairs were seen regularly from June 14. They appeared to be slightly more numerous in 1966 when lemmings were moderately abundant. A nest with two eggs on June 23 had but one on the 27th. The marked female (banded and dyed June 30) was seen incubating the eggs more often than the male, which was collected with its newly hatched young on July 15. A small downy of another pair was found out of the nest on July 18. A nest first seen on July 23 held one egg (live embryo within). A flying female juvenile, attended by two adults, was collected August 10. One subadult was seen inland on August 5.

***Larus hyperboreus* Gunnerus Glaucous Gull**

Pairs were at nesting ponds in early June. One pair defended a repaired nest (first seen in 1962) for at least nine days before producing their first egg. Incubation was well under way by the time their second and last egg was laid, 54 or more hours later on June 20. Glaucous Gulls were not seen incubating earlier inland, though a few evidently nested much earlier at the coast where some young hatched by July 18. Coastal nesting by the species on Jenny Lind Island was atypical. For lack of sea cliffs, widely scattered pairs nested on gravel just above high tide. A few pairs nested close together on islands off the

northeast coast. An incubating bird there on July 24 had nested late. We had failed to note nesting Glaucous Gulls on low shores by the sea on Victoria Island. Three downy young were colour banded (yellow) in or near nests during July 12-13. One adult male was collected June 23.

Larus thayeri Brooks Thayer's Gull

From one Thayer's Gull to upwards of 25 Thayer's Gulls were noted regularly from June 1 through August 9. Most were subadults of various ages that roosted with Glaucous Gulls near the DEW-Line Station. One subadult female was collected June 6.

Xema sabini (Sabine) Sabine's Gull

Three single birds were noted June 5. Flocks were noted from June 6. The largest flock observed occurred June 9 (23 birds). Egg-laying on a population basis started by June 19 and continued into early July. The apparent clutch at 21 nests was three (eight nests), two (eleven nests), and one (two nests). At least 36 hours elapsed between laying of the first and second, and the second and third, eggs of some clutches. Incubation started with the laying of the second egg at some nests with three-egg clutches. The incubation period for the last egg of a three-egg clutch was 22 days and seven hours (error not greater than 5.5 hours). Live eggs occurred as late as July 25. Young hatched as early as July 14. Young fledged when 21 to 24 days old. Flying young were first noted August 5. Predation of eggs by foxes was severe at those nests not surrounded by water, also at nesting ponds that dried rapidly through evaporation. Twenty Sabine's Gulls, including 13 adults, were banded June 29 to August 5. The following were collected: two adult males, June 18-28; fledged male juvenile, August 8; an 18-day-old female juvenile (down conspicuous, weight 169.2 gm, wing chord 158 mm, flattened wing 165 mm, tail 63.0 mm, exposed culmen 18.0 mm, tarsus 32.5 mm) on August 2. The juvenile of known age was not quite fledged; its eyes were dark blue, ringed by a narrow band of light blue; its upper mandible was dark grey with base and ventral edge flesh colour; its lower mandible was flesh colour tipped with dark grey; its legs, feet, and webs were light grey with ventral parts flesh colour.

Sterna paradisaea Pontoppidan Arctic Tern

Arctic Terns were first noted June 15 (two birds) and regularly from June 20. Although they occasionally flew inland, we found no evidence that they bred at the fresh waters. Scattered pairs and small colonies nested on sand or gravel just above high tide along the east coast. Of four nests found during July 22-23, three held newly hatched young or pipped eggs. One adult male was collected August 2.

Nyctea scandiaca (Linnaeus) Snowy Owl

Two widely separated pairs bred in the eastern half of Jenny Lind Island in 1966 when lemmings were at best moderately abundant. The nest of one pair was on a low but prominent ridge in the centre of a nesting colony of

Snow Geese. When first seen June 15, the owl nest held six eggs—probably the true clutch, since hatching appeared to be normal. Hatching started about July 2, but most of the brood perished before fledging. One sibling (third) disappeared, and four siblings died in the nest some time during July 18–24. The dead owlets appeared to have been in poor condition prior to death. Conceivably they had died of starvation. Only the fifth sibling (banded) survived. It seemed healthy enough when last checked August 5. With the single exception of a Lapland Longspur nestling, the only prey seen at this nest were lemmings, and they were not always present. So scarce was food that Parasitic Jaegers darted in and robbed the owl nest of its few lemmings before the young could eat them. The second owl nest was on an inconspicuous mound in rather flat, sandy tundra. The five young (banded and colour-banded yellow) were first seen July 17 when two recently killed lemmings and the remains of a female King Eider were by the nest. All five owlets but no prey were in or near the nest when last checked July 20. We saw no other Snowy Owls on the island. There can be no doubt that the owls breed when lemmings are scarce. Low breeding density, clutch size, and nesting success appear to be by-products of the limited food supply.

***Eremophila alpestris* (Linnaeus) Horned Lark**

The species appeared to be slightly more abundant in 1966 when widely scattered pairs were seen regularly from June 1. A nest with six eggs on June 7 was the largest clutch and the earliest nesting recorded by us for the species in the entire region. Another nest with five somewhat incubated eggs on June 12 indicated early nesting also. Flying juveniles were noted in early July. A female juvenile was collected July 7.

***Corvus corax* Linnaeus Common Raven**

Ravens probably visit Jenny Lind Island occasionally, though it is doubtful that they ever breed there. A single individual was seen several times near the DEW-Line site during the last week of May in 1966 by Walter Little.

***Anthus spinoletta* (Linnaeus) Water Pipit**

The species was not seen anywhere on Jenny Lind Island in 1962. A single bird was seen on a rocky ridge 1.5 miles inland on June 3 and 6, 1966.

***Calcarius lapponicus* (Linnaeus) Lapland Longspur**

These longspurs were common in 1966. Arrival, habitat preferences, breeding behaviour, and schedules were much the same as they were at Cambridge Bay. The following were banded: five nestlings, July 7–18; two flightless juveniles, July 17–29; one juvenile that flew weakly, August 5. The following were collected: two adult males, July 8; adult female, July 11; two female juveniles, July 8–17; set of six eggs with nest, June 22.

***Plectrophenax nivalis* (Linnaeus) Snow Bunting**

Most Snow Buntings were noted in the artificial environment of the DEW-Line Station, especially in disturbed areas with numerous piles of loose rock,

which afforded good nesting places. Away from the station, pairs were scattered along the rocky ridges, chiefly near the coast; some inhabited rough terrain near the beaches. Pairs were scarce in the extensive, flat tundra of the interior where there was little rock. A nest with one egg was found as early as June 8. Most eggs were probably laid in mid-June. One clutch was completed as late as June 28. At eight nests the clutch was six eggs (one nest) and seven eggs (seven nests). Incubation at some nests commenced with the laying of the fifth egg. The incubation periods for the last egg of three clutches were: 12 days and 5.5 hours (error not greater than 3.5 hours); 12 days and seven hours (error not greater than 2.5 hours); 12 days and eight hours (error not greater than one hour and 45 minutes). Young in nests were noted as early as June 25 and as late as July 19. Some young remained in the nest for as long as 14 days; some young flew weakly when 14 days old. Some broods were raised within a few hundred yards of the nest site; others were raised at least a mile away. We transferred two nestlings from one nest to another that had lost seven young to some predator. The foster parents accepted the two young and raised them successfully. Twenty-seven adults and young were banded July 3-14. The following were collected: adult male, June 3; adult female, July 31; two male juveniles (banded previously), July 12-29. The male juvenile (weight 38.7 gm, wing chord 96.0 mm, tail 63.0 mm, bill from nasal fossa to tip 6.7 mm, tarsus 21.0 mm) collected July 29 was 25 days old.

